California MEDICINE

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ME 83 NUMBER 4

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References: 1. West Virginia M. J. 49:292, 1953. 2. Mod. Med. 19:59, 1951. 3. Geriatrics 9:303, 1954.

California MEDICINE

OFFICIAL JOURNAL OF THE CALIFORNIA MEDICAL ASSOCIATION

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Civil Defense

The Plans for Medical Organization and Action in California

JUSTIN J. STEIN, *M.D.*, Los Angeles, W. DALTON DAVIS, *M.D.*, and FRANK L. COLE, *M.D.*, Berkeley

THE PURPOSE of this report is to outline the organization for medical Civil Defense in California, to list some of the accomplishments to date, and to reemphasize the great need for medical leadership in furthering civil defense.

An efficient, well supported civil defense organization is an absolute necessity for the survival of this nation from an all-out enemy attack. In past wars the enemy has never seriously struck at our shores or our cities. In future wars the enemy will be successful, in varying degrees, in bombing our cities and industries just as we will be in striking his cities and population centers. Civilians will no longer be in the protected or "back of the front lines." There will be no front lines. The people must be psychologically prepared and trained to withstand enemy attacks to our mainland and still have the will to win.

As to the necessity for having a civil defense organization, one merely needs to refer to the lessons gained by the Germans, English, Japanese and other nations during World War II.

Civil Defense requires the complete integration of all phases of industry and agriculture and, in particular, the help of every individual in the program. Our greatest asset is the people and they must be protected at all costs.

Briefly it can safely be stated that in the event of any major war:

1. California will present many high-priority targets.

2. The United States is highly vulnerable to attack by atomic and thermonuclear weapons, and by biological, chemical and conventional weapons.

3. Hundreds of thousands of casualties requiring treatment will result from an attack in which atomic and thermonuclear weapons are used.

4. The ability of this nation to survive without an excellent civil defense organization is open to question.

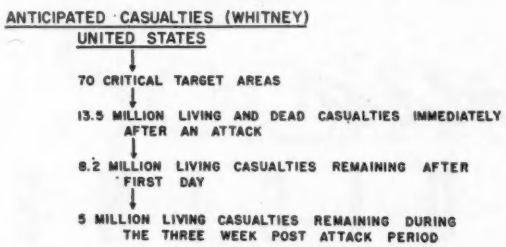
5. The industrial areas and centers of heavy concentration of population will probably represent major initial targets.

6. Regardless of the amount of money and resources available, the proper planning, recruiting, training and equipping of the civilian population take many months of time. It is most fortunate that we have already had five years in which to prepare. Much, however, remains to be done.

7. Every individual must have a civil defense assignment, must know first aid, the precautions to be taken before, during and after an attack, and have some basic practical knowledge of the effects and dangers of atomic and thermonuclear warfare.

Chairman, Committee on Military Affairs and Civil Defense, California Medical Association (Stein); Medical Consultant, Medical and Health Services Division, Office of Civil Defense, State of California (Davis); and Chief, Medical and Health Services Division, Office of Civil Defense, State of California (Cole).

CHART 1



THE PROBLEM

Whitney[1] has clearly outlined the enormous task which lies before us in his article on the "Federal Aspects of Civil Defense." He has stated that there are 70 critical target areas in the United States and that if these targets are all attacked simultaneously that there will be 13.5 million living and dead immediately afterward, with 8.2 million living casualties after the first day. There will then be the problem of treatment and management of five million casualties during the first three weeks of the post-attack period, not including the customary number of sick and injured (Charts 1, 2 and 3).

Upon recognition that California with its rapidly growing population and increasing number of industries presented many excellent critical targets to the enemy, concerted efforts were begun in July of 1950 to develop a civil defense program for the state. A civil defense law was enacted and the money was appropriated for this purpose. State Department of Public Health personnel, members of the California Medical Association and of numerous other organizations worked closely together.

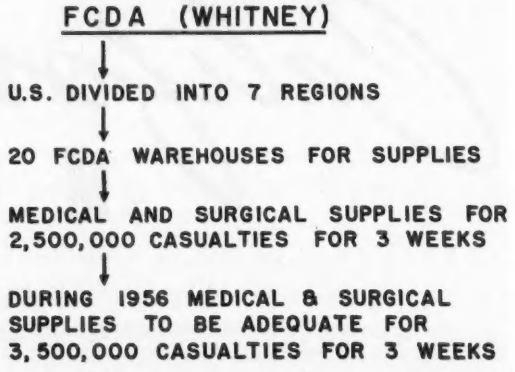
It was quickly realized that, with many targets under attack at one time, few medical supplies and little equipment could be counted upon for many hours after the attack. It would be necessary to train as many individuals as possible and at least one member of each family in first aid. Estimates would have to be made of hospital facilities and of the number of trained professional personnel and auxiliary professional groups that would be available. Lists would have to be made recording the schools and other structures that could be used as improvised hospitals, the amount of transportation available and medical supplies which could be obtained promptly. These are but a few of the many factors which would have to be determined well in advance of any major disaster.

THE OVERALL MEDICAL PLAN

With the foregoing in mind, the present Civil Defense Organization was provided for in legislation affecting civil defense and disaster as passed by the 1950 legislature. Several changes have been made since that time.

This act provides for the general reorganization

CHART 2.—Status of Federal Civil Defense Administration (FCDA) Disaster Plans



of the Civil Defense Agency. It contains suggested city and county ordinances relating to civil defense and disaster. It outlines master mutual aid agreements between political subdivisions in the state, as well as between states. Many other procedures peculiar to civil defense and major disaster are included in this act.

The state Civil Defense Organization[2] is set up as follows: The Governor is the overall chief and upon declaration by him of an extreme emergency, he assumes control. The Director of Civil Defense becomes his executive officer for civil defense and disaster. In 1955 a new law was enacted which provides that a state of extreme emergency will go into effect automatically without a proclamation "whenever this state is attacked by an enemy of the United States by the use of atomic weapons or upon the issuance by the Western Air Defense Forces of an alert warning indicating that an enemy attack is probable." Under the previous law the State Director of Civil Defense could proclaim the existence of a state of extreme emergency only when the Governor was "inaccessible" and "when conditions exist within any region or regions of the state which warrant such action." The overall plans for the organization of civil defense both during and prior to a state of extreme emergency are shown on Charts 4 and 5.

CHART 3.—Federal Civil Defense Administration (FCDA) Improvised Hospital Units

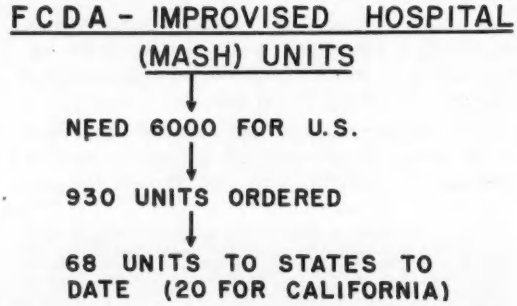
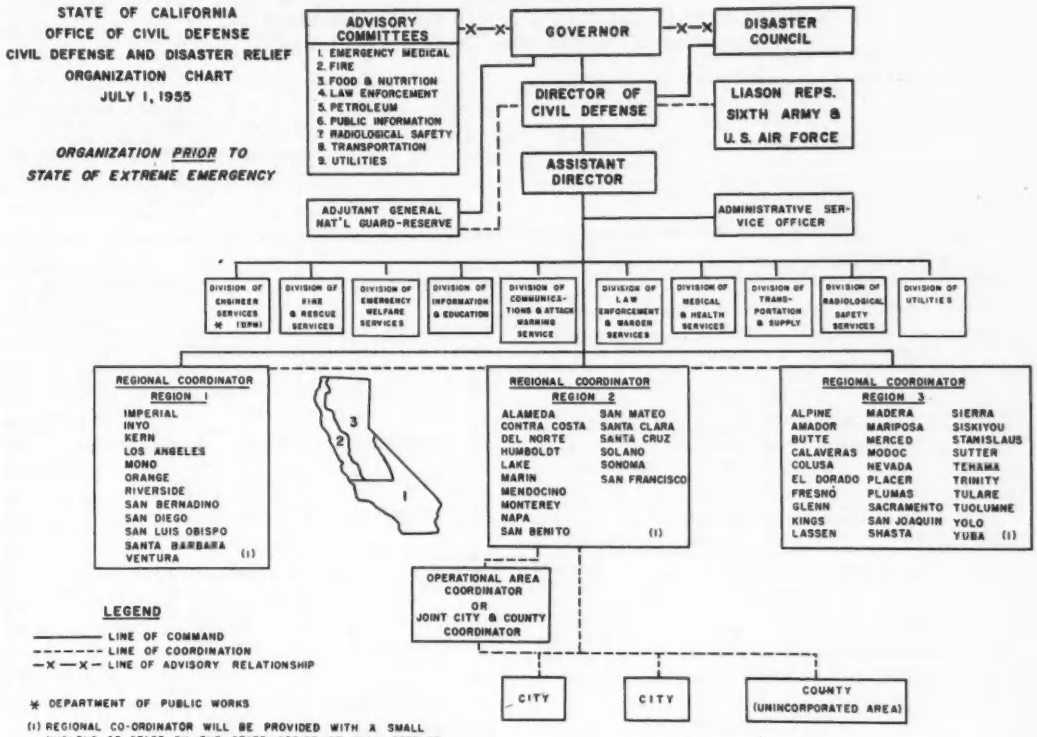


CHART 4

STATE OF CALIFORNIA
OFFICE OF CIVIL DEFENSE
CIVIL DEFENSE AND DISASTER RELIEF
ORGANIZATION CHART
JULY 1, 1955

ORGANIZATION PRIOR TO STATE OF EXTREME EMERGENCY



LEGEND

——— LINE OF COMMAND
- - - - - - - LINE OF COORDINATION
—X—X— LINE OF ADVISORY RELATIONSHIP

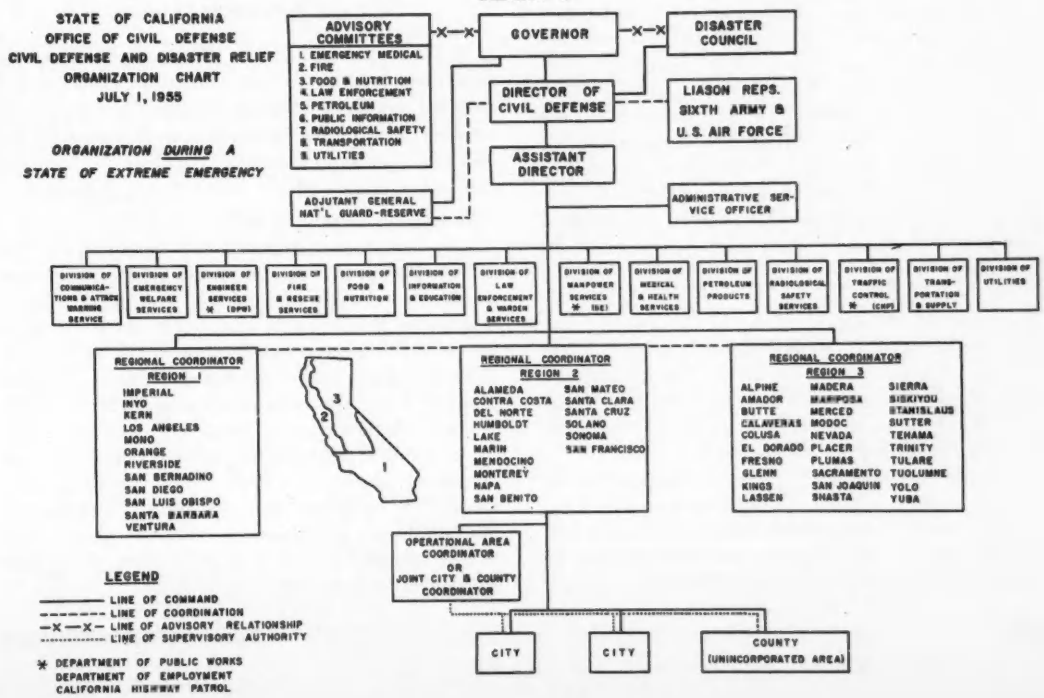
* DEPARTMENT OF PUBLIC WORKS

(1) REGIONAL CO-ORDINATOR WILL BE PROVIDED WITH A SMALL NUCLEUS OF STAFF BY THE STATE OFFICE OF CIVIL DEFENSE, SUPPLEMENTED BY SPECIALISTS AS NEEDED FROM TIME TO TIME. THE SERVICES STAFF WILL BE FORMED FOR BOTH PLANNING AND OPERATIONS BY REPRESENTATIVES CHOSEN BY THOSE SERVICES FROM THE REGION AT LARGE - THIS REPRESENTATIVE MAY BE REPRESENTED AT THE STATE REGION BY A DESIGNATED ALTERNATE

CHART 5

STATE OF CALIFORNIA
OFFICE OF CIVIL DEFENSE
CIVIL DEFENSE AND DISASTER RELIEF
ORGANIZATION CHART
JULY 1, 1955

ORGANIZATION DURING A STATE OF EXTREME EMERGENCY



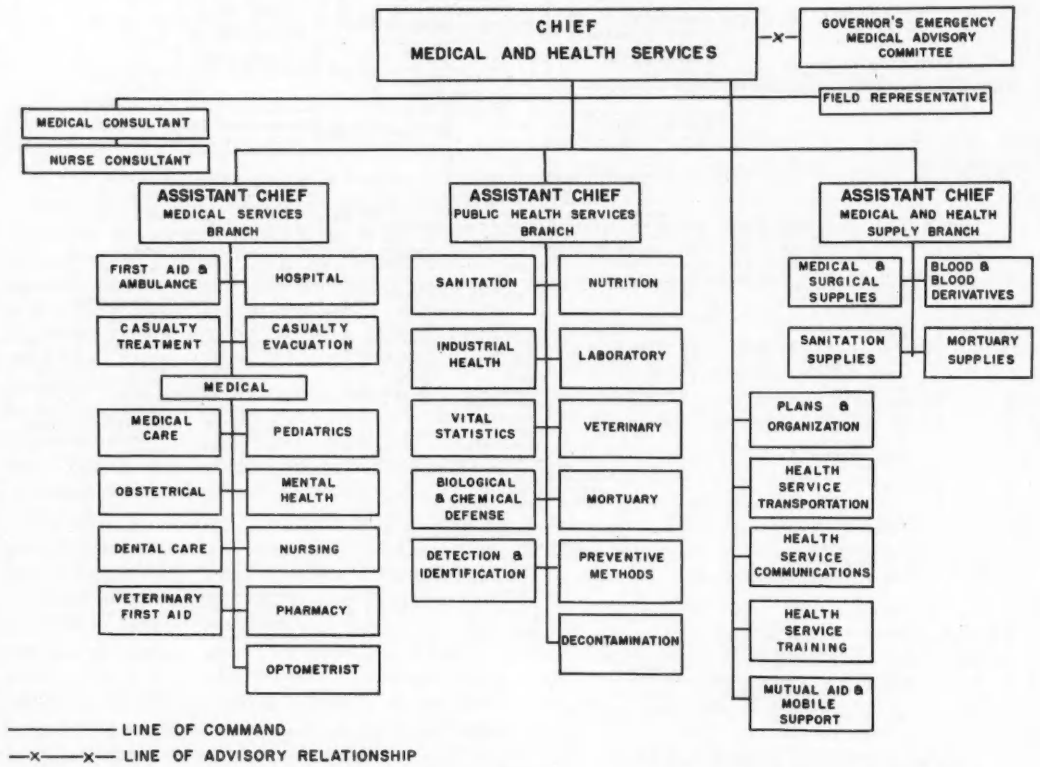
LEGEND

——— LINE OF COMMAND
- - - - - - - LINE OF COORDINATION
—X—X— LINE OF ADVISORY RELATIONSHIP
..... LINE OF SUPERVISORY AUTHORITY

* DEPARTMENT OF PUBLIC WORKS
DEPARTMENT OF EMPLOYMENT
CALIFORNIA HIGHWAY PATROL

CHART 6

STATE OF CALIFORNIA OFFICE OF CIVIL DEFENSE
FUNCTIONS OF MEDICAL AND HEALTH SERVICES DIVISION



Under the law the Director of the State Department of Public Health is charged with the responsibility for medical care for civilian casualties occurring within the state due to enemy action or any other extreme emergency. He has authority to use the facilities of the entire health department. In time of extreme emergency he becomes the head of the Medical and Health Services, under the Director of Civil Defense. The present chief of the Medical and Health Services becomes his executive officer or assistant.

The medical aspects of the state Civil Defense Organization are illustrated in Chart 6. The Medical and Health Service Organization[3] is subdivided in accord with its many functions. The Governor's Emergency Medical Advisory Committee works very closely in an advisory capacity with the Medical and Health Service Organization.

The Medical and Health Service Organization on the state level is a planning organization. The local jurisdictions are the operational areas. Recruitment, assignment and training can most successfully be accomplished in the local areas (Chart 6).

THE C.M.A. CIVIL DEFENSE COMMITTEE

In 1950 the California Medical Association's committee on civil defense was called the Committee on Emergency Medical Service. The name was later changed to the Committee on Military Affairs and Civil Defense. It was felt that civil defense and medical military affairs were closely related and could best be combined in this committee.

The Governor appointed the chairman of the C.M.A. Committee on Emergency Medical Services to the Governor's Emergency Medical Advisory Committee as its chairman, in 1950. From 1950 to the present time the members of the Committee on Military Affairs and Civil Defense of the California Medical Association have been very active in working with the Governor's Emergency Medical Advisory Committee and with the Medical Health Services personnel of the California State Health Department. The chairman and one other physician on the Governor's Emergency Medical Advisory Committee are also members of the C.M.A. Committee on Military Affairs and Civil Defense.

During the past five years the C.M.A. committee and the Governor's Emergency Medical Advisory Committee have helped accomplish the following:

1. Formulate an overall medical policy and organization.

2. Prepare casualty estimates for the target areas on the basis of both the 20 kiloton atomic bomb and the 20 megaton thermonuclear bomb.

3. Prepare regional annexes and plans for a coordinated medical and health service throughout the state.

4. Prepare estimates of costs of medical supplies and equipment.

5. Determine the number of first aid stations for the state (683) (Chart 7).

6. Determine kinds and quantity of supplies for the first aid stations.

7. Determine the number of first aid stations for each region.

8. Prepare requisitions for supplies and correlate through the supply division of civil defense and the state purchasing division.

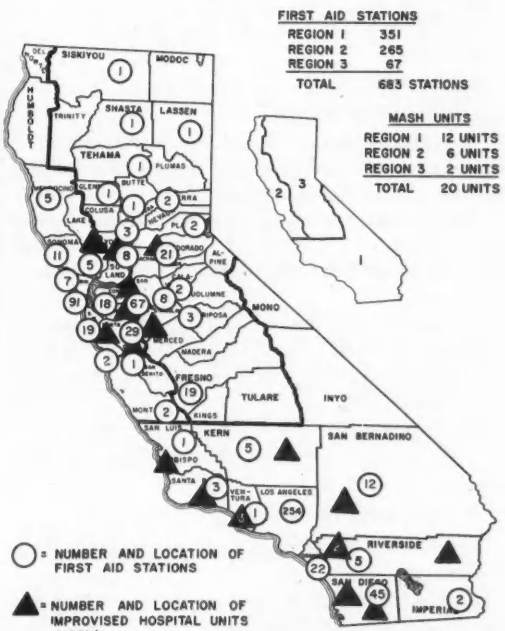
9. Determine the number and location of improvised hospital units (Chart 7).

10. Revise all civil defense plans after the development and detonation of the thermonuclear bomb.

11. Help the State Office of Civil Defense prepare civil defense manuals, some of which are as follows:

CHART 7

DISTRIBUTION OF STATE CIVIL DEFENSE FIRST AID STATION SUPPLIES AND IMPROVISED HOSPITAL UNITS



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State of California, Department of Public Health and Disaster Plan.

Recommendations for Civil Defense Relative to Radiological Safety, by Andrew H. Dowdy and Associates.

Manual for Operating Procedure Radiological Services Section at the Control Center, State Office of Civil Defense (Rev. January 1954).

Manual for Radiological Monitoring. Instructor's Guide. State of California, Office of Civil Defense, Division of Radiological Safety Services, (December 1953).

12. Procure and unitize training units for aid stations and distribute them to the various regions.

13. Hold meetings and courses on Civil Defense throughout the state. (Many have been sponsored and attended.)

14. Hold courses in disaster nursing for nurses, including information regarding atomic warfare. (Some 5,000 nurses have had the courses.)

Many other problems have been studied and effective measures taken.

STATE PLANS

Both the Governor's Emergency Medical Advisory Committee and the Committee on Military Affairs and Civil Defense for the California Medical Association will continue to develop the medical supply program. All medical civilian defense plans will be continually under scrutiny and they will be changed to conform with the development of new weapons. Further study and plans will be made with regard to emergency water supplies, sanitation procedures, food and milk inspection for the general population, mass care centers, and for medical care at assembly points for people during a major disaster. Further plans and procedures will be developed for handling atomic and hydrogen bomb casualties. Also studies will be continued with regard to mutual aid between the regions and between the neighboring states. Full cooperation will be given to all other civil defense agencies and plans will always be kept flexible to cope with changing trends. The above are but a few of the many problems which will be explored during the coming months.

MEDICAL SUPPLIES

Early in the planning it was felt that it was of utmost importance to find out how much medical equipment and supplies would be needed and obtain

them as quickly as possible so the medical profession would have something to work with.

There is nothing so frustrating to trained physicians as to be able to do something but to have nothing to work with. A complete report on the amount of money expended, both state and federal matching funds, and the items purchased is given as follows:

Fifty complete sanitation units have been purchased by the State Office of Civil Defense and they have been distributed to local health departments (Chart 8). The 50 hypochlorinators and 111 hand pumps are small in number but they will be indispensable in a major disaster.

CHART 8

DISTRIBUTION OF STATE CIVIL DEFENSE SANITATION SUPPLIES

WHAT CAN THE MEDICAL PROFESSION DO?

Every county medical group of any appreciable size—and smaller county medical groups combined with other small groups or with adjacent larger societies—should appoint a committee for civil defense in case of a major disaster. Some of the things that should be accomplished immediately by these groups are:

1. Establish a working liaison with all other civil defense agencies.

2. Provide for the procurement and assignment of medical personnel. The civilian needs in the next war will probably be greater than those of the military. In light of the fact that the utilization of medical personnel by the armed forces during World War II was very inefficient in numerous instances, the organized medical profession should at once crystallize its opinions regarding the assignment and procurement of physicians by the armed forces and make its recommendations known to the proper authorities. The organized medical profession must take the initiative in all medical civil defense problems. Every member of the medical profession should be given a definite civil defense assignment.

3. Development of disaster plans by all hospitals in the state. The plans should include the following:

Designation of a disaster committee to be in charge of overall planning.

Designation of a director and assistant directors.

Designation of a chief of staff for professional services.

Designation of specialized teams for specific purposes such as:

Trauma	Laboratory
Burns	Nursing
Fractures	Radiological defense
X-rays	Neurosurgical
Maxillofacial	Casualty collecting
Epidemiological	General treatment and
Blood and blood derivatives	care, etc.

Designation of a receiving area

Designation of treatment wards or areas

Designation of operating rooms

Supply procedures

Food procurement, preparation, type of emergency diet, etc.

Identification methods and procedures

Records

Public information

Utilities and engineering

The neighborhood should be surveyed with a view to taking over buildings suitable for housing patients during the emergency.

The problems of panic control, handling enormous numbers of visitors and anxious relatives, traffic control, etc., should be assigned to competent personnel.

A more comprehensive outline of this plan is contained in State Office of Civil Defense "Manual for Existing, Auxiliary and Improvised Hospitals," dated March 1952.

The hospital plan must also provide for:

1. Exploration of present bed facilities on short notice.

2. Evacuation of patients if necessary.

3. Selection of alternate hospitals to evacuate to if necessary.

4. Number, location, and capacity of convalescent homes, if any, in the area.

5. A registry of all trained laboratory personnel, registered nurses, practical nurses, nurses aides and others who can immediately be called to duty.

Simple standardized procedures of treatment should be worked out as much as possible for the most common types of injuries.

Additional points which should be planned for are as follows:

1. A simple method for keeping records on all casualties.

2. The type and number of transportation available to transport patients or casualties. Motor ambulances, motor trucks, motor buses, laundry trucks, etc.; also the number of splints, litters, blankets and first aid supplies available.

Inventories of all types of medical supplies, such as dressings, drugs, biologicals, antibiotics, surgical, equipment, laboratory supplies, blood and blood derivatives, and of other supplies should be kept up to date at all times.

The California Medical Association Committee on Military Affairs and Civil Defense and the Governor's Emergency Medical Advisory Committee has also helped in the development and accomplishment of the following:

A blood procurement program has been set up.

Approximately 378,000 blood vacuum bottles together with donor and recipient sets have been shipped and stored at various locations throughout the state (Chart 9).

Almost all of the equipment, drugs, dressings, antibiotics, dried plasma, splints, litters and blankets for the aid stations have been received, unitized, packed, and shipped, and stored in the various regions of the state.

Many hospitals throughout the state are organized for disaster according to plans in the Civil Defense Hospital Manual.

A plan has been developed for rotation through state hospitals of stored antibiotics to reduce, as far as possible, loss through the expiration of potency.

MEDICAL AND HEALTH SURVEY

A medical and health survey of the resources of all counties has been done in California[4] for the purpose of finding out what resources are available and what would be the maximum number of people the city or county could care for in case of disaster.

In making the survey the following resources in the areas were considered:

Personnel	Hospitals
Weather	Clinics
Utilities	Laboratories
Sewage disposal capacity	Rest homes
Food supply	Blood banks
Feeding facilities	Medical supplies
Housing	Clothing
Transportation	Emergency sanitary facilities

CHART 9

DISTRIBUTION OF STATE CIVIL DEFENSE BLOOD BOTTLES, DONOR AND RECIPIENT SETS

The type of medical care that the patients would receive would depend largely upon some of the factors as follows:

1. The medical and health disaster plan and organization for the area in question.

2. The proportion of professional people to patient load.

3. The amount of medical supplies and equipment available.

4. The number of trained volunteer medical technicians.

5. The number of first aid workers.

6. The number of permanent and improvised hospitals.

7. The available whole blood, blood derivatives and blood substitutes.

Table 1 is a brief summary of the data from counties that have completed the medical and health part of the care capacity survey. The summary shows the number of patients that could be housed and the number of medical personnel available at present in the various counties surveyed.

The data in Table 1 serve to point up the need for careful planning for the greatest and most efficient use of trained medical and health personnel. All available personnel should be trained in accepted techniques for the mass handling of casualties. Likewise the importance of every hospital having a disaster plan cannot be overemphasized.

TABLE 1.—*Data obtained from medical and health survey of counties to determine capacity for medical care in event of disaster.*

Counties	Existing Hospitals No.	Existing Hospitals No. Beds	Total Max. Bed Spaces Available (including Expanded Hospitals)	Physicians	Dentists	Registered Nurses	Technicians	Other Auxiliary Personnel	Red Cross Trained To Assist Nurses	Red Cross Trained First Aid Workers
Del Norte	2	67	2,976	5	2	1	6	6	28	.....
Humboldt	6	400	113,907	76	34	318	24	59	.....	2,500
Lake	1	30	13,007	14	5	63	3	9	.....	.....
Mendocino	6	223	14,048	42	15	130	8	13	.....	.....
Butte	6	380	18,318	65	42	150	29	55	200	200
Shasta	4	277	2,814	33	16	150	19	15	50	.....
Tehama	3	130	2,321	15	7	12	11	15	30	30
Marin	3	267	19,043	303	35	418	22	28	88	.....
Napa	5	6,486	18,644	106	30	150	25	44	30	100
Sonoma	8	3,577	61,707	196	66	.....	45	118	186	1,809
Solano	4	461	24,985	132	50	229	41	63	104	1,200
Contra Costa	6	765	48,043	153	85	520	262	151	260	33
Santa Clara	8	1,375	113,474	608	265	1,650	231	283	210	2,000
San Mateo	12	1,833	55,957	478	138	1,685	118	15	6,340	4,323
Stanislaus	7	730	1,567	146	54	500	30	92	64	10,000
Sacramento	8	1,513	57,414	339	184	522	123	257	278	26,000
Tuolumne	2	90	5,357	12	6	62	7	13	212	300
Yolo	2	283	15,219	15	6	61	3	11	20	200
Monterey	7	674	35,376	138	69	350	32	93	75	108
San Benito	2	78	2,223	11	4	20	8	13	50	50
Santa Cruz	4	328	19,755	76	33	241	19	82	.....	.....
*Fresno	6	613	62,586	220	22	742	40	176	375	900
*Kern	9	973	25,311	29	7	49	.....	.....	37	108
Madera	3	157	11,446	15	6	90	16	17	186	40
*Tulare	5	243	17,940	47	26	119	16	38	234	1,785
*San Luis Obispo	4	182	4,947	38	11	114	15	18	54	460
Santa Barbara	6	861	27,016	206	68	419	62	78	101	636
Ventura	5	510	31,549	142	60	316	52	94	288	3,179
*Inyo	2	49	534	11	4	40	4	9	76	150
Mono	1	8	662	1	.....	6	.....	.....	.....	55
Riverside	11	579	2,972	215	58	272	46	116	143	1,265
San Bernardino	12	1,059	37,015	185	36	204	42	146	147	.....
Orange	5	1,235	36,160	343	158	1,000	75	205	446	2,698
Imperial	2	102	10,886	53	12	.....	23	18	.....	.....
San Diego (except San Diego City)	3	127	153,252	1,125	.....	2,500	1,300	650	2,500	6,000

*Incomplete.

ATOMIC, BIOLOGICAL AND CHEMICAL WARFARE

Another paper in this issue will be devoted to the medical aspects of atomic and thermonuclear warfare and therefore no comments on those topics will be made here.

The veterinary, public health and agricultural groups have been alerted to the possibilities of biological warfare. Civilians should be encouraged to seek advice and information from physicians regarding any unusual sickness of humans, plants or animals. They should report any unusual sickness of themselves or of any of their domestic pets or animals to a physician so that the physician can see to it that the proper measures are taken and that the disease is reported if necessary. Maintaining high standards of sanitation and observing all public health precautions will greatly reduce the hazards of biological warfare.

Many experts believe that in view of the increased destructiveness of the newer weapons and the fact that they can be efficiently used over target areas, it will not be necessary for the enemy to resort to chemical warfare. The weather conditions would have to be accurately known and very favorable for the chemical agents to be effective.

Even if civilians were issued gas masks, there is little likelihood of their having them with them or close at hand at the proper time. If the "nerve" gas were used, it would require that immediate protective measures including the use of atropine sulfate, be taken.

Many new informative articles have been released during the past two years concerning both biological and chemical warfare which should be studied in detail. Defense against biological and chemical warfare is not being neglected.

THE ARMED FORCES AND THE CIVILIANS

The armed forces will have their plans and supplies and no civil defense plan should be based on the premise that the troops or their supplies and facilities will be turned over for civilian use. All plans should be made without considering the use of the personnel and the supplies of the armed forces. Certainly for planning purposes, however, both the armed forces and the civilians should carefully consider each other's problems and needs. In no circumstances should the armed forces be saddled with problems which can be readily dealt with by trained civilians.

One must consider the possibility of hundreds of thousands of casualties occurring in a matter of minutes as a result of a simultaneous concentrated attack upon many key target cities. The armed forces will be busy, there will be no transport by planes for a time, and the supplies and equipment available will be only those which have been planned for and are on hand. When these supplies are exhausted it may be hours or several days before new supplies will arrive. It is impossible to look into the future and prepare against every kind of emergency, but great obstacles can be overcome by a reasonable, practical, workable civil defense plan.

It is hoped that the armed forces are fully cognizant of the great medical needs of the civilian population in any major future war and that they have fully considered this in all their medical plans.[5]

DISPERSAL AND EVACUATION

Studies are being made with regard to dispersal and evacuation of the population.[6] Since thermonuclear weapons are fully capable of destroying large cities, the only real protection against these weapons is either not to be there at the time of the blast or to have as much protective shelter as possible.

The only real defense against the thermonuclear weapons is dispersal of the population if there is sufficient warning time—three or more hours. It is regrettable that dispersal of industries has not been carried out during recent years.

Even if dispersal cannot be done because of shortage of time, evacuation of people in the path of the radioactive "fall-out" or where fires are a problem, may save many lives.

Dispersal and evacuation are associated with many problems such as road blocks, inadequate roads and poor planning, but much can be done about this. It is hoped that a consistent unified plan will be formulated in the near future with regard to evacuation.

CONCLUSIONS

Much has been accomplished in medical civil defense planning and organization in California, but a great deal remains to be done.

Civil Defense is here to stay and requires the active participation of every individual to the limit of his capacity.

Although the federal government must provide leadership, information of the magnitude of the problems to be faced, information of the type and quantity of supplies needed and money for matching purposes, the crux of the whole situation is how well the average individual down to the smallest communities is psychologically prepared, trained, and willing to carry out his appointed tasks.

At a time of crisis, the age-old cry of the injured has been, "Where is the doctor?" We must not fail them.

U.C.L.A. School of Medicine, Los Angeles 24.

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Civil Defense

Physicians' Responsibilities

FRANK F. SCHADE, M.D., Los Angeles

IF AND WHEN the nations of the world come to armed conflict to determine which of the two great economic and political structures shall prevail, it is certain that our cities will be attacked in such ways that enormous numbers of casualties will instantly make the greatest medical task in all history. If evacuation and dispersal plans are sufficiently developed, the number of casualties could be materially reduced, but another very complex problem will result from the dislocation of millions of people. Very briefly stated, the physician's responsibility in Civil Defense is to be ready, willing and prepared to fit into whatever segment of the effort he is assigned to serve, either for the care of casualties or the provision of the essential minimal medical care for the nonaffected population.

One of the first questions that no doubt comes to mind is: For what should we be prepared? The answer can be condensed into the statement that at some time or other, in some phase of the effort, physicians will be required to treat practically every condition to which the human body can be subjected. In view of the nature of the weapons that probably will be employed, by far the greatest majority of the patients will be suffering from the traumatic and thermal lesions so well known to every physician. These include lacerations, fractures, crushing injuries, penetrating wounds, trauma to organs, contusions, abrasions and flash and thermal burns. In addition, many people could also suffer from the effects of the elements—from heat exhaustion or prostration, dehydration or protracted chilling.

It is probable that psychic trauma, of individuals or groups, will be of such magnitude that even persons who are not otherwise injured will require careful attention to either restore them to a near normal state of useful participation or to prevent the development of mass reactions. Fear and anxiety form the bases of these reactions—fear engendered by the magnitude and horror of the disaster and anxiety for their own safety, for their families and friends, for their property and possessions and over the possibility of another attack. If unchecked and uncontrolled, panic can develop, during which individual and group rationalization is replaced by impulsive and frequently violent actions and reactions. A physician seeing people in such conditions can do much to assist in the rapid return of a fairly rational status by a demonstration of genuinely sympathetic interest and understanding, by confident reassurance, by letting them talk and thus assisting in the psychic decompression, and frequently by getting them some nourishment.

It must be recognized, though, that there will be many for whom these simple psychotherapeutic measures will be inadequate and who will require the specialized care of the psychiatrist. During the reconstruction phase, many readjustments will be necessary, when the loss of members of the family, of home, business and property is fully comprehended. Many will be able to make these readjustments, but it must be anticipated that a considerable number will need assistance in the form of psychotherapy. Many of the casualties will also require help in making the readjustments, especially the blind, the deformed and the mutilated.

Modern warfare assumes the use of atomic and thermonuclear weapons and the possible use of biological and chemical agents. Although the majority of the survivors of an atomic or thermonuclear detonation will suffer from traumatic injuries or burns, there will be some who will have radiation effects. This will be something new for American physicians. If chemical warfare is used, our physicians will have another new series of syndromes to treat. The widely publicized "nerve gases" require prompt administration of large doses of atropine. Hence, to be effective, self administration by the affected population will be necessary, with only those survivors with late symptoms coming into the casualty care system. Chemical agents were used in the first World War, but not in the second. Will they be used in the third?

The deliberate use of biological agents is a distinct possibility. In all of the wars of history until the most recent one, disease killed far more than the most ingenious weapons man could devise. In all wars of the past there was a battle against naturally occurring biological agents. Hence, if these agents are deliberately used, it is only logical to expect bacteria, viruses or toxins that are now known, although it is possible that those used may not be too familiar in our part of the world. The

first line of defense has been in existence for many years in our health departments. It is of the greatest importance that unseasonable outbreaks of the usual diseases or the appearance of significant numbers of unfamiliar diseases be reported promptly.

There of course will be all the general medical and surgical conditions that normally affect the population, including the communicable diseases. When dispersal plans are put into operation, it is to be anticipated that with crowding in improvised shelters the incidence of all communicable diseases and upper respiratory infections will increase greatly. There will also be an increase in obstetrical cases, for as experience in the last war in the bombed cities of Europe demonstrated, in addition to those women who would normally be due to go into labor, large numbers either aborted or went into labor prematurely.

Preventive medicine will be of added importance in all its phases — immunizations, segregation of active cases of certain diseases, careful attention to sanitation, supervision of the preparation of food and the assurance of the potability of water.

After the acute phase will come the long and difficult task of rehabilitation, which could very well be protracted over many years. Plastic operations to make many people more acceptable to their fellows or to improve function. Reeducation and training of the blind; revision of amputations, and procurement and instruction in the use of prosthetic appliances; physical therapy for a wide variety of injuries—these are but a few of the tasks that will confront the medical profession during the readjustment period.

In Civil Defense the basic responsibility of physicians is that of saving the greatest number of lives and of restoring the largest possible number of people to useful, productive places in society. To do this, preparation for disaster must be made long before it strikes. As a starting point, estimates must be made of the casualties to be expected, based upon what we know of the weapons to be used, of population concentrations during different times of the day, of traffic potentials of the lines of communication, of personnel and facilities distribution and the availability of supplies.

From there, plans must be drawn up that are sufficiently flexible to be made to cope with a variety of conditions, from a fairly limited disaster, either natural or man-made, to a truly major catastrophe such as would be caused by the use of a thermonuclear weapon. Plans must also be made to very quickly provide medical services for the millions of displaced persons when dispersal becomes effective. There could be many different combinations of these contingencies. Plans not only must be flexible, but they must also be constantly revised to keep abreast of changing concepts necessitated by the development of new weapons and techniques. Included in planning there must be presumptive assignment of duties, with the realization that the conditions at the time may make it utterly impossible for any individual or group to function in the assigned capacity. Regardless of the type of practice now followed, physicians are all trained in the basic fundamentals of medicine and surgery, and must be prepared upon a moment's notice to make themselves fit into the effort wherever they are needed. There must also be a high degree of cooperation with and acceptance of allied professions and the many ancillary groups.

During disaster, the first responsibility is to the casualties. This implies that the physicians will stand fast and resist the natural impulse to flee. It also means that the normal anxieties about family, friends and possessions must be quickly overcome and that all will report for duty promptly. The destruction and confusion will prevent many from going to their assigned place of duty, and then they must willingly participate wherever the need exists. A major attack upon several of our metropolitan centers will require total mobilization of the entire state. Most of those living away from the target cities will be required to leave their homes to assist in the care of the tremendous number of casualties, leaving the smallest possible number behind to care for the most vital of the emergencies that will arise in the home communities.

Work will be done under the most primitive and frequently improvised conditions. All existing facilities will be required to expand many times beyond their normal capacity. Supply shortages will develop very quickly. All of these things emphasize the necessity of using standardized methods of treatment, the greatest of ingenuity and the determination to work far beyond what have been considered the limits of endurance. In addition to the purely professional tasks, it may also be necessary to supervise radiological, chemical and bacterial decontamination. An additional nonprofessional duty is that of safeguarding the property and valuables of those going through the casualty care system.

As to the noncasualties, minimal essential medical care must be provided for those in the nontarget communities and for the thousands of persons crowded into the mass care centers. This can probably best be accomplished by establishing a service of dispensary type, reserving hospitalization for the most urgent cases. The greatest of skill, judgment and tact will be necessary to assure that those who are actually sick get attention, to eliminate the many who feign illness for whatever reasons, and to ease

the psychic trauma. Provision will also have to be made for obstetrical care, since, as was previously stated, a considerable increase in this service must be expected.

The related medical services must also be provided, although in somewhat restricted form, for the noncasualties. Among these are public health services, including communicable disease control, mass immunizations, sanitation supervision, food and water inspection and the maintenance of vital statistical records. The importance of keeping accurate records cannot be overemphasized, especially in the mass care centers.

Some of the most difficult problems will be encountered after the immediate disaster period. Rehabilitation of the casualties has been mentioned previously. As the survivors gradually return to what had been their home communities, a system of medical care will have to be established, under the most difficult and trying conditions. Many facilities will have been destroyed. Communications will be greatly limited. Supplies and equipment will be nonexistent or available in very limited amounts. Large areas of the cities will be completely destroyed or very badly damaged. How long it will take until public utilities are provided is a matter of speculation. Controls of all kinds must be very rigid to prevent utter chaos. All of these elements will contribute to one of the most difficult tasks that the profession will have—that of continuing to provide care for those remaining in the evacuation and mass care centers and at the same time rebuilding a medical care system for those returning to their home cities.

Physicians also have continuing responsibilities to the patients they are treating at the time of attack. How much time they can give to them will depend upon the extent of the disaster and the location of the physician in relation to the devastated areas.

In limited disasters, the majority of physicians may continue to practice in their usual manner, although some will be called upon to care for the victims. It is possible that those who are in the immediate vicinity will have total temporary disruption of their practices until offices can be reestablished.

When evacuation and dispersal is effective, the extent of the dispersal will determine the degree of disruption of the usual physician-patient relationship, both in the target and in the nontarget areas. The very nature of modern urban practice is such that it would be practically impossible for any evacuated physician to maintain contact with his evacuee patients.

The physicians in the reception areas will be faced with tremendous tasks of caring for the many thousands of people who will be in temporary residence in their areas, even if the evacuated physicians can assist. Physicians in the other nontarget areas must remain on a stand-by basis, awaiting their call to go to the assistance of the stricken areas.

In the event of a major disaster there will be total mobilization throughout the entire state. There can be no such thing as "business as usual" in any type of human endeavor, including the practice of medicine. We must be prepared to accept a complete interruption of the usual physician-patient relationship. The barest minimum of physicians will remain behind in the nonaffected communities, even at great distances from the disaster areas. Every available man and woman will be urgently needed, which will necessitate many being gone from their home communities for days. How long it will be until there is a return to anything near the previous normal can be determined only by the nature and extent of the disaster.

Finally, we have political responsibilities, both as physicians and as good citizens. An adequate, well organized and well equipped civil defense system costs millions of dollars, even at the local level. It is our duty to insist that the legislative bodies, federal, state and local, appropriate sufficient funds to assure that when the day of disaster comes, we will be prepared. The will to do something is not enough. There must be organization, direction, leadership, plans that can quickly be put into operation, and the necessary supplies and materiel. It is possible that Civil Defense will not be the effective instrument that it should be until it is given its proper stature in government. The ideal solution would seem to be the creation of a Department of Civil Defense within the federal Department of Defense, to be headed by a secretary who would rank equally with the secretaries of the Army, Navy and Air Force, and with representation on the Joint Chiefs of Staff. This is an ideal that will be difficult to accomplish, but it is so vital to the lives, welfare and property of so many millions of our fellow citizens that every physician could be proud of any part he could have in its realization.

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Civil Defense

The Medical Aspects of Atomic and Thermonuclear Warfare

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IT IS IMPERATIVE that all physicians, regardless of their particular interest in medicine, learn as much as possible about atomic energy. Whether we approve of it or not, scientific developments based on atomic energy and nuclear research have changed and will continue to change the whole course of our lives and that of nations.

For many years there was considerable apprehension that, with the growing population and economy of this nation, the natural resources of coal, oil and gas would be depleted. With the advent of the new atomic energy discoveries, almost limitless sources are now available to provide fuel and power. Also deposits of thorium, which are more plentiful than uranium and which can be utilized in the production of atomic energy, are constantly being discovered.

It is unfortunate that, at mention of the term *atomic energy*, immediately most people think in terms of atomic and hydrogen bombs and of their great destructive force. Many of the better things to come will result from atomic energy research. The concentration of effort upon peacetime pursuits has really just begun. Surely, then, this great new scientific discovery—the harnessing of the energy in the atom—will stimulate everyone to wonder, to learn as much as possible about it, and to encourage further atomic energy research.

If we are to achieve these developments, we must have peace for a long time ahead. Peace is based on a nation prepared not only to wage atomic war but to defend itself in case of attack. A well prepared civil defense is the key. The data presented here are what every doctor should know.

The present report is in three parts: Part I—The Phenomenology of the A-bomb; Part II—Preparations for Radiological Defense in California; Part III—The Management of Radiation Injuries.

I. The Phenomenology of the A-Bomb

From Einstein's theory of relativity ($E=mc^2$) it is known that mass and energy are interchangeable. At any time there is a decrease in mass as a result of a reaction, then this decrease in mass is converted into energy. In the Einstein equation, E stands for energy, m for mass, and c^2 is the square of the velocity of light.

In an atomic explosion the energy is released by a nuclear rearrangement of a suitable atomic nucleus and the matter is converted into energy. The sum total of the energy released by an atomic or thermonuclear explosion is as follows: Blast, approximately 55 per cent; thermal radiation, 30 per cent; nuclear radiation, 15 per cent, of which approximately 10 per cent is from delayed or residual radiation.

Uranium is the element of highest atomic number that exists in nature. It consists of a mixture of three isotopic forms with mass numbers 234, 235 and 238. When uranium is fissioned, only about 0.1 per cent of its energy is released.

In uranium ore the uranium-238 isotope constitutes 99.282 per cent; uranium-235, only 0.712 per cent; and the remainder is uranium-234. There is only one part of U-235 for 140 parts of U-238.

When neutrons are added to U-235 nuclei, a violent reaction takes place which results in nuclear fission or the splitting of the atom into two parts with the further release of one to three neutrons or an average of 2.5 neutrons with each fission or splitting of the U-235 nucleus (Chart 1). The two parts of the atom which are split off are called fission products. Neutrons are electrically neutral particles present in all atomic nuclei except simple hydrogen. They are about the same weight as protons and are approximately 1,840 times heavier than an electron. With the emission of neutrons in the fission of the U-235 nuclei, gamma rays and beta rays are also produced. Alpha rays may be emitted in the fissioning process but usually they come from unfissioned material.

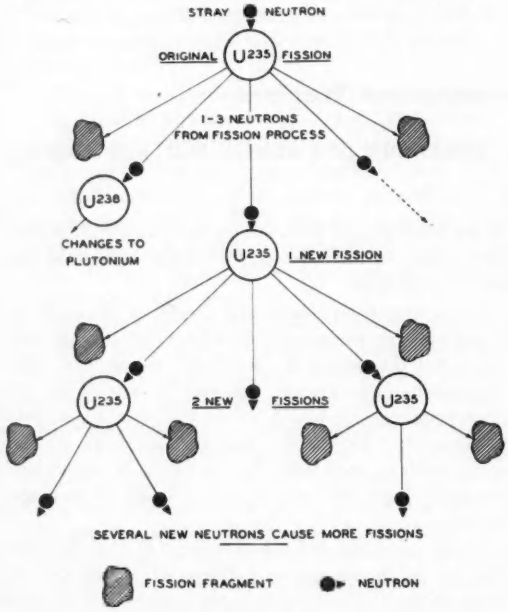
Plutonium-239, which is a man-made fissionable material, will undergo fission as a result of bombardment by either fast or slow neutrons, just as U-235 does. It emits alpha particles and has a half life of 24,000 years. The half life of U-235 is 7.07×10^8 years (107,000,000 years).

Plutonium is formed as follows:

Plutonium-238 captures a neutron and becomes 239, which has a half life of 23 minutes and decays by the emission of a negative beta particle with

Chairman, Radiologic Safety Advisory Committee, State of California (Warren); Chairman, Committee on Military Affairs and Civil Defense, C.M.A., and member Radiologic Safety Advisory Committee (Stein).

Chart 1.—Splitting or fission of the U-235 nucleus.



neptunium-239 formed, which is a scarce isotope having a half life of 2.3 days. It emits negative beta particles forming plutonium-239 (Pu-239).

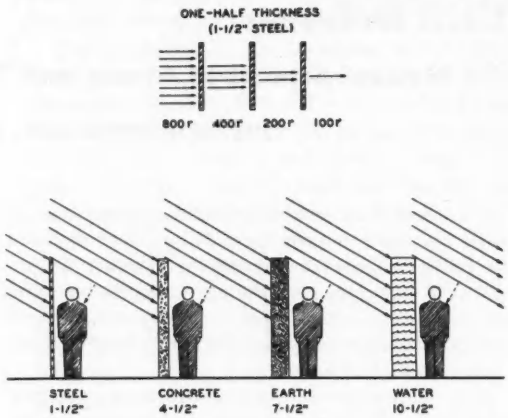
Uranium-235 and plutonium-239 are used in atomic bombs.

It is therefore noted that when the U-235 atom is fissioned or split, neutrons are also produced which help bring about the chain reaction so necessary to cause the explosion. With each fission an average of 2.5 neutrons are added so that if the fissioning or splitting continues a sustained chain reaction may result.

If two unequal parts of U-235 or of Pu-239 can be brought together so that an overcritical mass is formed and held together sufficiently long, the tremendous chain reaction produced in a substantial number of the atoms will result in the production of tremendous heat (more than a million degrees centigrade in a millionth of a second) which will cause the explosion. A critical mass is one in which the number of neutrons being produced is greater than the number necessary to keep the fission reaction going at a fixed rate and when the number is exactly equal to the number of electrons lost.

The efficiency of the bomb will depend upon how long the two fragments of U-235 or Pu-239 can be held together. The more fissioning of the atoms which occurs, the more energy produced. The critical size of a fissionable mass is that amount which is necessary to produce a sustained chain reaction.

Chart 2.—The comparative shielding effects of steel, concrete, earth, and water.



The H-bomb is an open ended weapon because it is not limited in the amount of critical material to be used. Tritium which is used in the hydrogen bomb is produced by irradiating lithium metal in a nuclear reactor.

The "nominal" A-bomb has been the 20 kiloton bomb size. Bombs of this size were exploded over Hiroshima and Nagasaki. Severe damage from this size bomb will cover about 4.6 square miles. The radioactivity produced in this type of bomb at the time of the explosion is equivalent to more than a million tons of radium. Improved A-bombs have been made so that greater efficiency has been obtained.

The hydrogen bombs are spoken of in terms of megatons (one megaton having the explosive equivalent of one million tons of trinitrotoluene). For practical planning purposes in California, the 20 megaton hydrogen bomb is considered as presenting the worst possible disaster. The hydrogen bombs are city-killers. Considerable damage and dangerous levels of radioactivity may be expected out to 20 miles in all directions from the point of explosion, depending upon wind and climatic conditions when the bombs are detonated. There are some observers who believe that, since the improved A-bombs are so effective, there is little need for and few targets worthy of the hydrogen bomb.

Protection from Nuclear Radiation*

Because it has great penetrating properties, nuclear radiation either requires that there be protection by shielding materials or that one be at a considerable distance from the detonation. Time and distance are two very important factors. With greater distances even without protective shielding, one may be completely safe.

*For simplicity, all estimates made here are based on a 20-kiloton bomb, unless otherwise specified.

TABLE 1.—Comparison of casualties for atomic and conventional bombs

	Hiroshima Atomic Bomb	Nagasaki Atomic Bomb	Tokyo 1,667 Tons TNT and Incendiary	Average of 93 Attacks 1,129 Tons TNT and Incendiary
Population per square mile	35,000	65,000	130,000	.....
Square miles destroyed	4.7	1.8	15.8	1.8
Killed and missing	70,000	36,000	83,000	1,850
Injured	70,000	40,000	102,000	1,830
Mortality per square mile destroyed	15,000	20,000	5,200	1,000
Casualties per square mile destroyed	30,000	42,000	11,800	2,000

The most commonly available materials for shielding against nuclear radiation are steel, concrete, earth and water. The half-thickness† for steel is approximately 1½ inches, concrete 4½ inches, earth 7½ inches and for water 10½ inches (see Chart 2).

It has been estimated that for an air burst of a 20-kiloton bomb at an altitude of 2,000 feet, if an individual was one-half mile from ground zero, it would require 6 inches of steel, or 19 inches of concrete, or 30 inches of dirt to reduce the radiation intensity to 100 r (see Figures 1 and 2). The range of the immediate nuclear reaction does not increase in proportion to the greater energy release of the bomb. In other words, a bomb twice as big does not do twice as much damage.

The bomb may be exploded in the air, on the ground surface, below the ground, and on the surface of or below the surface of water. The manner in which the bomb is exploded will depend upon the type and size of the bomb and, in particular, the military objective. A comparison of casualties for atomic and conventional bombs is shown in Table 1.

Air Burst

An air burst is when a bomb is exploded in the air at such a height that the fire ball does not touch the earth or water surface. A maximum of destructive effect with a minimum of radioactivity remaining in the bomb area can be obtained in this manner. People would be able to enter the bombed area in a matter of minutes following the bomb burst after radiological surveys had been made.

Ball of Fire

A ball of fire with considerably more than 1,000,000°C. of heat in its center is formed in less than a millionth of a second. The intensity of the light is such that the brightness is many times that of the sun at midday. The glare in the sky may be seen for hundreds of miles if the bomb is detonated before sunrise. Within 0.5 of a second the ball of fire measures 900 feet in diameter. At one second it is more than 900 feet in diameter and goes upward at the rate of from 150 to 300 feet per second.

†Half-thickness is that amount of thickness of the material in question which will reduce the radiation intensity by one-half.

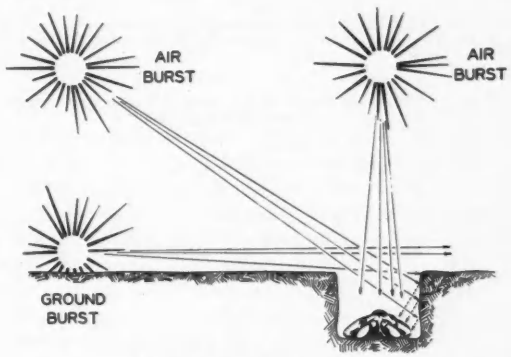


Figure 1.—Foxhole type of shelter of great value except for the overhead bomb explosion.

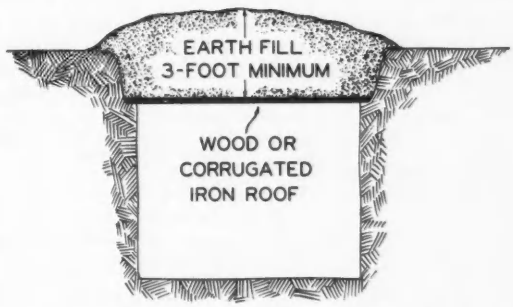


Figure 2.—Three feet of packed earth provides a great deal of protection.

At approximately 10 seconds it is about one-third of a mile from the point of explosion. At about 90 seconds the rising cloud is high enough in the air so that an individual on the ground would be safe from gamma radiation (see Charts 3, 4 and 5).

High winds occur in the immediate vicinity of the explosion, from the updraft; and, depending upon the size of the bomb detonation and the nature of the underlying terrain, various amounts of dirt, rocks and other materials will be sucked up into the rapidly rising column. The top of the rising column consists of radioactive oxides of the fission products, of water vapor and droplets, and of dust and other materials, depending upon the terrain at the site of the detonation. It takes about 8.5 minutes

Chart 3.—Results of high air burst after 0.5 seconds.

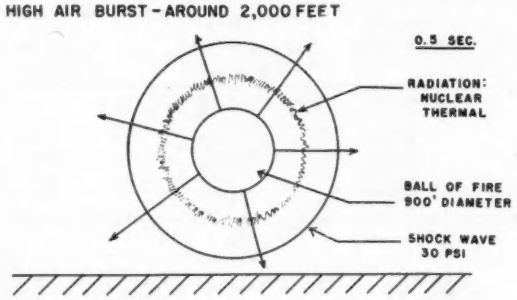
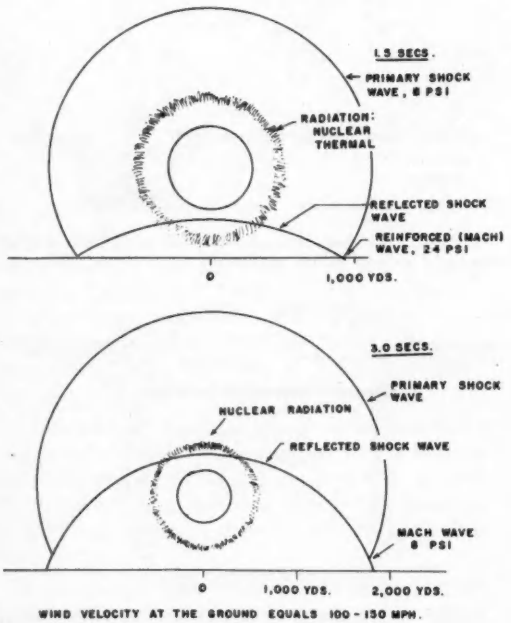


Chart 4.—High air burst effects and physical appearance at 1.5 seconds and 3 seconds.

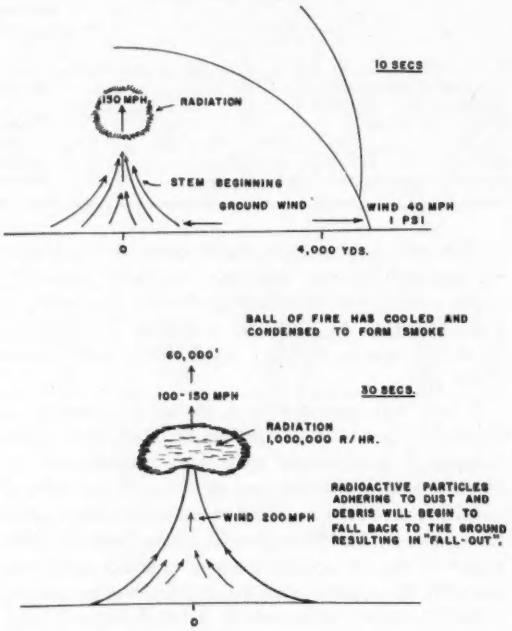


for the atomic cloud to reach 30,000 feet. As the cloud ascends it liberates heat and when it reaches 40,000 to 60,000 feet its temperature is fairly near that of the atmosphere and it will spread out and form the familiar mushroom appearance.

Blast Effect

A shock wave goes out faster from the expanding gases than the expansion of the ball of fire. When the shock wave reaches the ground from a 2,000-foot burst, it may have more than 30 pounds of pressure per square inch (in addition to the normal atmospheric pressure of 14.7 pounds per square inch). This pressure lasts for about one second. It then decreases until it is reinforced by the reflected shock wave at about 1,000 yards in one second. The reflected shock wave is known as the Mach effect, and it increases the pressure to 24 pounds per square inch. At about 10 seconds, or at about 5,000 yards distance, the pressure has dropped to one pound per square inch over that of the normal atmospheric pressure.

Chart 5.—High air burst effects at 10 seconds and 30 seconds.



The instant the shock wave and wind blast have passed with the decreased pressure, a vacuum is formed and the winds are reversed in direction and rush back at lower speeds. This phase lasts for about two seconds.

The effect of the blast will depend upon the size of the bomb and upon prevailing meteorological conditions. Within a radius of one-half mile numerous individuals would die of radiation effects, of trauma from flying objects, and of burns. From one to two miles from the bomb burst there would be radiation injuries, burns, and varying degrees and combinations of different types of trauma. From two to three miles from the bomb burst there would be wounds largely from flying objects.

Thermal Radiation

Flash burns will be produced as far out as two miles and heat can be felt to ten miles. Tremendous amounts of infra-red, visible and ultraviolet light are produced. The intensity of the effects will depend also upon prevailing climatic conditions. The thermal radiation is absorbed in the first three seconds following the explosion. Loose fitting white

clothing provides more protection than tight fitting dark clothing (Figure 3). The subject of burns is discussed in another paper in this issue.

Nuclear Radiation

The instantaneous radiation consists of gamma rays and neutrons and forms 5 per cent of the 15 per cent of total nuclear radiation. The initial radiation is dangerous to about 2,000 yards. The neutrons travel less than 2,000 yards before they are absorbed in the air. The instantaneous radiations persist for only a millionth of a second and they come from the chain reaction. The alpha particles have a positive charge, low penetrability, and are absorbed in less than 4 inches of air and by thin layers of paper or clothing. The beta rays or particles produced are negatively charged electrons with low penetrability and do not constitute a hazard from the immediate explosion effect. Both the alpha and beta particles may cause serious radiation injuries as a secondary effect from the residual radiation if inhaled or ingested. Skin burns may also be produced.

The delayed radiations comprise about 10 per cent of the 15 per cent total radiations from the bomb. Beta particles and gamma radiation are emitted by the fission products for some time after the bomb is detonated.

Since most of the fission products are either in or around the ball of fire, they ascend with the cloud. Within two minutes after a high air burst the cloud is so far away that there is little danger from radiation unless the wind currents and "fall-out" are unfavorable. As the cloud rises the exposure hazard diminishes by distance and time; since 50 per cent of the gamma radiation is emitted in one second, 80 per cent in the first ten seconds, and practically none after two minutes. Problems associated with the radioactive fall-out will be discussed later.

Surface Burst

A surface burst is one in which the bomb is detonated at or close to the surface. It causes great damage and the blast effect is tremendous, since it is largely outward instead of downward and outward. More thermal radiation is produced and a great cloud of radioactive debris is sucked up into the rapidly ascending cloud. The radioactive metallic oxide particles in the cloud will adhere to the dirt. The contaminated dirt particles in the cloud become contaminated with radioactivity and later fall to the earth, producing what is commonly known as the fall-out.

It would not be safe to enter the bombed area until after studies had been made by radiological monitoring groups. It might be months before one could safely enter the contaminated area to remain for any considerable time.

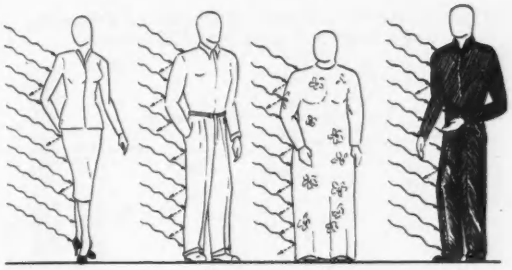


Figure 3.—Loose fitting white clothing provides more protection from thermal radiation than tight fitting clothing.

The ingestion or inhalation of radioactive materials may constitute a great hazard. The beta particles can only penetrate a few millimeters of the intact skin. The deposition of the fission products of plutonium-239 or of uranium-235 in the body is a definite hazard. Thorough washing of the feet, hands, hair and other external surfaces of the body will prevent some of the hazard. It will also help to avoid, if possible, inhalation or ingestion of the radioactive materials.

Packaged food or canned foods can be safely consumed providing the container is intact. Water can usually be safely consumed, especially if there has been a relatively long interval of time between the bomb blast and use of the water. Beef can be consumed if the outer portion has been protected by a cover in some way.

Underwater Burst

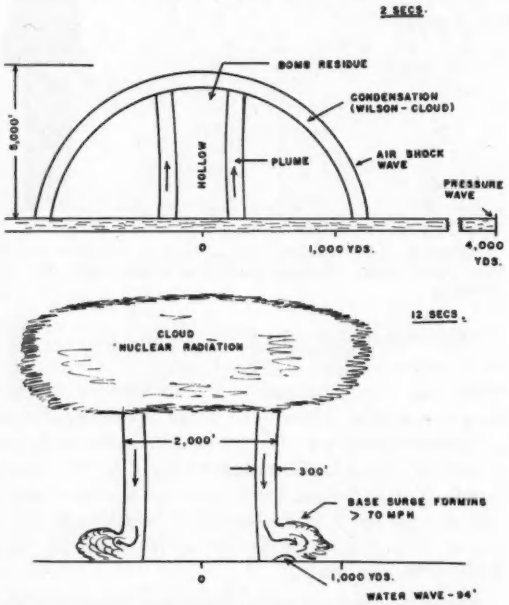
In the event of underwater burst, practically all the initial nuclear and thermal radiation is absorbed by the water. There would probably be no direct thermal injuries but there might be many flame injuries from fires aboard ships and in the harbor installations. (See Charts 6, 7 and 8.)

Radioactive Fall-Out

Radioactive fall-out is the term used to describe the great amount of radioactive metallic oxide particles, dirt and debris of all types sucked up into the cloud as it ascends from the earth or from an underwater burst into the sky and which later fall back to the earth or water surface.

What is important in the fall-out is the amount of radioactivity which it contains. The force and direction of the winds, and the atmospheric conditions prevailing will increase or decrease the fall-out hazards. Knowing what the prevailing wind patterns are for any given area and being able to determine them quickly following any bomb burst, is of great importance. The wind patterns are constantly changing and one cannot predict what they will be on any given date.

Chart 6.—Results and physical appearance after underwater burst at 2 seconds and 12 seconds.



Recently in discussing the fall-out problem, Libby[3] made the following statement: "The nuclear reactions furnishing the energy in atomic and thermonuclear weapons produce radioactivities as end products. In the ordinary atomic bomb, for each 20,000 tons of TNT equivalent, about two pounds of radioactive materials are produced. In these two pounds are some ninety different radioactive species, varying in natural lifetime from fractions of a second to many years. The mixture as a whole decreases in radioactivity in such a way that for every seven fold increase in age, the radioactivity is decreased ten fold. Thus the radioactivity by seven hours after the explosion has decreased to 1/10 the radioactivity at one hour; at 49 hours to 1/100; at two weeks to 1/1000; and at three months to 1/10,000." (See Chart 9.)

The fall-out pattern can be determined by skilled personnel who have the proper equipment and training. It is very necessary to be able to estimate the pattern, because whole communities may be in the path and with proper warning they could be evacuated, since it may take several hours for the fall-out to reach the ground at a considerable distance. Also, after areas are bombed it can be determined if they are safe to enter and for how long a period of time.

II. Radiological Defense*

It can be safely said that California has one of the finest radiological defense organizations and plans in this country and perhaps the best.

*For brevity: Radef.

Chart 7.—Results and physical appearance after underwater burst at 20 seconds and after 60 seconds.

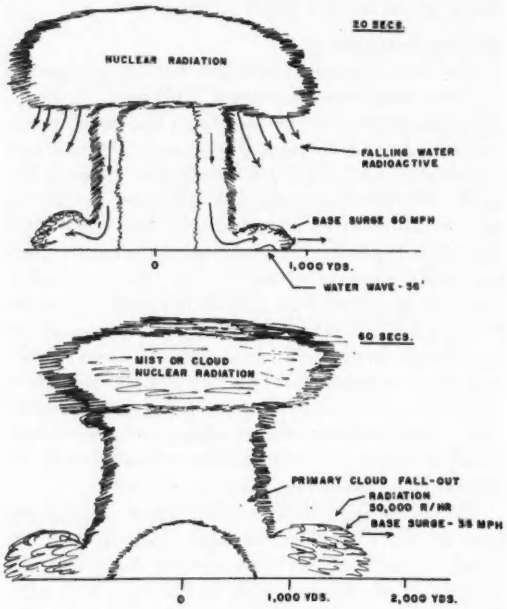
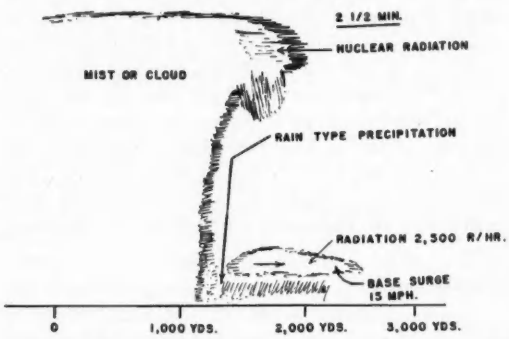


Chart 8.—Results and physical appearance of underwater burst at 2½ minutes.



After the invasion of Korea in June of 1950, and with the formulation of civil defense plans it was decided that radiological defense should be a big factor in the planning. California is highly vulnerable to attack from the air and the sea and has many critical targets.

Basic assumptions are as follows:

1. An enemy exists who is capable of attacking this country.
2. Atomic weapons, guided missiles, high explosives, and sabotage are available to the enemy.
3. The attack could be a surprise one, and if it were an air attack, a certain percentage of the planes could get through to targets here just as our planes could get to critical targets in enemy territory.

4. All important production, population, military, and harbor centers would be critical targets.

5. Twenty-megaton thermonuclear weapons would be used. (This is a change from earlier assumptions; in the beginning only the 20-kiloton A-bombs were considered in defense planning.)

Effects of the New Weapons

The effects of the 20 kiloton A-bomb have been described in detail. The force of the blast wave of the hydrogen bomb may be 1,000 times as powerful as that of a fission bomb, but the blast and incendiary effects of the hydrogen bomb would be only about ten times as great as those of a fission bomb. The radiation hazards would be increased over the nominal A-bomb but not greatly except for the amount of fall-out produced in surface or subsurface bursts.

Residual Radioactivity

The residual radioactivity with the larger thermonuclear weapons may spread downwind for distances varying from 50 to 300 miles, depending upon the winds. The fall-out path could vary from 10 to 50 miles or more in width.

The hazard of radioactivity could extend out as far as 20 miles in all directions from the bomb center.

Some of the changes in planning following the announcement of the thermonuclear weapons was that about 75 per cent of all first aid equipment should be stored more than 20 miles and preferably 40 miles from the center of critical targets. Also mobile improvised hospital units should be located where feasible, more than 20 miles and preferably 40 miles from the critical target areas.

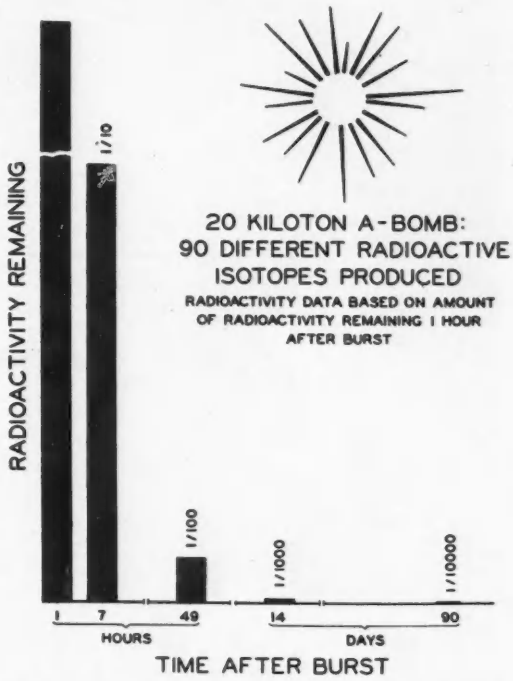
Central Centers

The Radiological Safety Advisory Committee surveyed the state and recommended that, since no single fixed location within the state could be considered safe at all times, there should be at least three control centers established in the northern part of the state and preferably four in the southern part of the state. It was also recommended that mobile communication buses could be used if necessary for this purpose. The purchase of five additional communication buses was recommended to augment the two already in use. Adequate communications are essential to any successful civil defense program and this has been repeatedly demonstrated both in military operations and in natural disasters which have occurred.

Cost of the Program

Since January 1951, approximately $1,100,000 has been spent on radiological defense in California. Almost $400,000 of this sum was spent on radiation

Chart 9



detection instruments. Instruments for both training and actual field use have been secured.

Four thousand one hundred and seventy monitoring instruments have been purchased and most of them have been delivered. Five hundred of the instruments have been obtained for use in fixed and improvised hospitals. (Hospital facilities and trained medical personnel will represent our most valuable resource subsequent to an attack. These must not be contaminated with radioactivity from the clothing or by persons coming into the area.)

Sixteen mobile radiological laboratories have been purchased. They are completely self-contained, mobile, radio-chemical laboratories, designed to provide accurate measurements of radioactivity in food, water, air, and soil. They also carry their own communications. (See Figure 4.)

One hundred and five radiological monitor squad trailers were designed by the division staff and constructed at Folsom prison. Each trailer carries all the equipment necessary for a squad of 20 radiological monitors. The equipment includes radiation detection instruments, mobile communication equipment and other materials necessary for efficient squad operation.

How a Problem in Radef Is Handled

Determining the situation with regard to radioactivity can be accomplished as follows:

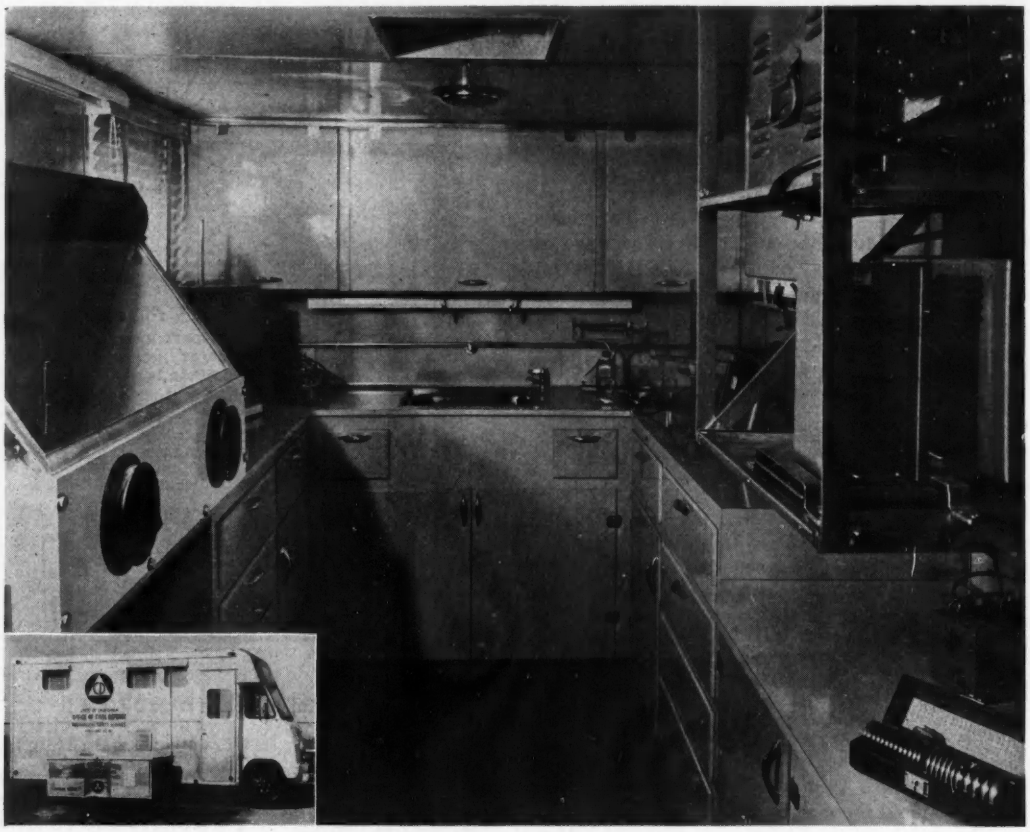


Figure 4.—Mobile radiological laboratory.

1. The protective services of the state, namely, law enforcement, fire control, engineering and utilities, have been given 1500 radiation detection instruments. Selected personnel of those services have been carefully trained in use of the instruments and they have them immediately available in their cars.

In the event of an attack the selected persons would determine the immediate situation in their area and transmit this information to evaluation centers which, in turn, would transmit the information to the designated authorities. This would be the first source of information, since these persons are on duty daily and are usually well dispersed.

2. The volunteer monitors would take over the basic monitoring work as soon as possible. They will be invaluable in the immediate post-attack period and also in the clean-up operations which will be necessary for some time afterward.

The protective services would continue to keep their instruments for use as necessary for their own protection and information while they were busy carrying out their assigned tasks.

3. The personnel of the 63 Division of Highways Maintenance stations have been trained in monitoring and have been issued instruments. Since they are scattered over the state and have fixed installations with instruments immediately available, much valuable information can be obtained from them.

The above plan should be an efficient practical manner in which to obtain enough data to be of value in estimating the fall-out problem and also problems peculiar to any one area.

Training Program

Emphasis has been placed on training in radiological defense. Training courses conducted by the division staff during 1954 alone provided 35 volunteer monitor instructors, 57 protective services monitor instructors, and 23 mobile radiological laboratory specialists. Also, three training courses were conducted for control center and evaluation personnel.

The volunteer monitor instructors who were instructed and assisted by the division staff, in turn trained some 400 volunteer monitors and 5,000 protective service monitors during the year.

The Radiologist

The radiologist because of his general medical training, his special knowledge of radiation biology and of the clinical effects of radioactivity, will be a most valuable asset to civil defense. He should be encouraged to play an increasingly greater role in civil defense.

Decontamination

The residual radioactivity consists of beta and gamma-emitting fission products and induced radioactive materials. Also alpha particles may be emitted by unfissioned material.

The residual contaminating radioactivity may produce two kinds of hazard. (1) If it remains outside the body and produces localized injuries or it radiates large areas of the body, and (2) If the radioactive material is inhaled, ingested or enters the body through open wounds.

The following are rules and notes applicable in the case of persons and/or areas suspected of being contaminated:

1. Thoroughly cleanse the body and especially the hair, axillae, groins, fingernails and feet and hands (repeated scrubbings if necessary).
2. Monitor suspected areas of contamination.
3. Put on clean clothing.
4. Evacuate affected personnel.
5. Thoroughly cleanse all wounds. Leave wounds open after thorough debridement.
6. All packaged and canned foods may be used if outside containers are cleansed.
7. Even if drinking city water, boil it. The boiling will not remove radioactivity but will make it sanitary. There will be little danger of radioactivity in the water stored in the mains. It should be monitored, however.
8. Neither gamma radiation nor the external radiation from alpha and beta emitters will cause an individual to become radioactive.

1955 Objectives of Radef

With the advent of the thermonuclear weapons, some of the planning and problems to be considered are as follows:

1. Reevaluate previous plans for distribution of instruments and equipment.
2. Revise training goals, particularly with regard to support regions.
3. Increase emphasis on meteorological studies and information.
4. Attempt to obtain additional means of securing immediate post-attack radiological information.
5. Provide assistance and advice for overall Civil Defense planning, as well as for individual civil defense services regarding the atomic and thermonuclear weapons and associated radiation hazards.

III. The Diagnosis and Management of Radiation Injuries

As was stated previously, when either the H-bomb or the fission type of A-bomb in which uranium-235 and plutonium-239 are used is exploded, there is a sudden release of energy in terms of blast, intense heat and light and highly penetrating invisible radiations.

The initial nuclear radiation consists of gamma rays and neutrons. The residual ionizing radiation results in a persistence of radioactive substances, emitting alpha and beta particles and gamma rays.

The initial nuclear radiation, which consists of gamma rays and neutrons, is produced within the first 90 seconds after fission occurs. The two together represent about 5 per cent of the total released nuclear energy.

The residual nuclear radiation which remains after the initial 90 second period consists of the following: Alpha particles from unfissioned material, beta particles and gamma rays from fission products, and materials made artificially radioactive by neutron bombardment.

It must be emphasized that all radiation is damaging to some degree. If the amount of radiation is slight and only a small area of the body is affected, the body cells may recover to such an extent that no obvious damage or cell injury has occurred. For example 5,000 roentgens may be directed all in one treatment to a skin cancer that is one or two centimeters in diameter without doing much injury. However, if 400 roentgens were given to the entire body in one treatment, about 50 per cent of the persons receiving that dose would be dead within 30 days.

It has been estimated that the human body can tolerate a weekly dose of 0.3 roentgens for many years without detrimental injury. Every possible precaution is taken, however, in peaceful pursuits to ensure that no radiation or as little as possible reaches a person in the course of his work with radioactive materials or x-ray generating equipment.

With proper precautions, gamma ray and roentgen rays can be administered to persons who have cancer without producing irreparable tissue injury.

The ionization of tissues or the absorption of the energy from the radiation by the tissues results in the alteration of cell function or in cell death. The effects are largely upon the cell nuclei, then on the cytoplasm; then chromosomal changes, reduction in mitoses, inhibition of enzyme production, changes in cell membrane permeability and other changes. The effects of radiation are greatest during the period of reproduction of the cells. There is still much to be learned about radiation biology, but it is

TABLE 2.—Summary of clinical symptoms of radiation sickness

Time After Exposure	Lethal Dose (660 r)	Median Lethal Dose (400 r)	Moderate Dose (300-100 r)
	Nausea and vomiting after 1 to 2 hours.	Nausea and vomiting after 1 to 2 hours.	
First week	No definite symptoms.		
	Diarrhea.		
	Vomiting.		
.....	Inflammation of mouth and throat.	No definite symptoms.	
	Fever.		No definite symptoms.
Second week	Rapid emaciation.		
	Death.		
.....	(Mortality probably 100 per cent.)	Beginning epilation.	
		Loss of appetite and general malaise.	
Third week		Fever.	Epilation.
.....		Severe inflammation of mouth and throat.	Loss of appetite and general malaise.
		Pallor.	Sore throat.
Fourth week		Petechiae, diarrhea, and nosebleeds.	Pallor.
		Rapid emaciation.	Petechiae.
.....		Death.	Diarrhea.
		(Mortality probably 50 per cent.)	Moderate emaciation.
			(Recovery likely unless complicated by poor previous health or superimposed injuries or infections.)

definitely known that the absorption of energy from radiation may produce temporary or permanent injury to one or more biological systems, depending upon the dose given.

The sensitivity of tissues to radiation is usually in the following order: Lymphoid cells, polymorphonuclear and eosinophilic leukocytes, bone marrow, the reproductive organs, salivary glands, skin, mucous membranes, endothelial cells lining the blood vessels and the peritoneum, connective tissue, muscle, bone and nerve cells. The nerve cells are considered to be the most radioresistant.

The radiation changes produced may be early or late. They may be confined to small areas of the body, or, brought about by radiation of the entire body or by the inhalation or ingestion of radioactive materials. Total body radiation in large doses at one time may produce the acute radiation syndrome and cause death in a short time. However, total body radiation may be given in small doses in the treatment of certain types of cancer with little evidence of harm. Similarly radioactive materials may be taken by mouth, with little harm, in the regulated treatment of certain diseases. On the other hand, it may be taken accidentally in harmful doses such as might occur from continuous and repeated exposures to radioactive contamination from the fall-out.

The injudicious use of x-rays and radium by many of the radiologists in the early days resulted in many radiation "burns" or permanent injuries. Also the studies of the radium dial workers who later died of bone sarcoma have been of considerable value in learning about the ultimate effects of the prolonged absorption of the energy of radiations. The probable early effects of acute radiation doses over the whole body are as follows:

Acute Dose	*Probable Effect*
0-25 r	No serious injury
25-50	Possible blood changes but no serious injury
50-100	Blood-cell changes, some injury, no disability
100-200	Injury, possible disability
200-400	Injury and disability certain, death possible.
400	Fatal to 50 per cent of subjects in six weeks.
600 or more . .	Fatal within a few days to two weeks.

With the acute radiation syndrome (clinical syndrome of radiation sickness) nausea, vomiting, and diarrhea usually occur the first day or two after lethal exposures. Increasingly severe diarrhea, and general malaise and fever follow. The patient may also be relatively free of any severe symptoms for the first few days. Secondary infection is a common terminal symptom. Pharyngitis with symptoms referable to the upper respiratory tract may also occur. In 10 to 14 days epilation may be noted. The exposed person may die from failure of the hemopoietic system within the sixth week, but the length of life and the severity of the symptoms will vary inversely with the amount of exposure to the radiation. A summary of the clinical symptoms of radiation sickness is presented in Table 2.

Diagnosis

The differentiation of individuals suffering from the acute radiation syndrome or from varying degrees of radiation exposure from those suffering simple shock or combination of trauma and shock, is difficult in the early stages.

If there is leukopenia or a drop in the lymphocytes, the nausea and vomiting, shock and other symptoms are probably not a reaction to merely being in a bombed area but to radiation exposure. If recording monitoring instruments are available, the information they give will be a great help in evaluating the dosage received and the probable prognosis. If all of the individuals in a given area have leukopenia, this will be significant of radiation exposure. Epilation will also be significant of large dosage and of grave prognosis.

Treatment

Although there is a great deal of research under way to find a specific treatment for radiation injury, none has been found. In case of attack, a decision will have to be made whether persons with evidently lethal dosage should receive treatment in the face of overwhelming numbers with little or no exposure to radiation needing all the supplies available. This refers to burns and other trauma.

The following points are of great value in the treatment:

1. Complete rest and food and water are important. The radiated individuals become easily fatigued, and with lowered resistance they are subject to infections.

2. Since infection is common and with a greatly lowered resistance, antibiotics will be of considerable value in patients with sublethal exposure.

3. Transfusions will be of value for persons who have had sublethal exposure, in order to carry them along until the bone marrow recovers the capacity to manufacture enough blood to sustain life.

4. Intravenous feedings for persons who are vomiting and debilitated and unable to take nourishment by mouth.

Individuals react differently to ionizing radiation, and what may be a lethal dose for one may not be for another.

In general, for persons having acute symptoms of diarrhea and bleeding from irradiation within the first two weeks, the prognosis is poor, as it is also for those with purpura and extreme leukopenia in the fourth to sixth week. However, the longer the delay in the onset of evidence of extreme bone marrow damage, the better the prognosis and the more value to be obtained from supportive treatment.

In general, also, treatment for acute radiation injury will not be begun until about the second week, since persons who die sooner probably received dosage for which no treatment would help anyway.

There was very little water, food, shelter or blood, and no antibiotics or general nursing care, for the Japanese who survived the A-bomb blasts. If even good first aid measures had been available, many who died might have been saved.

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ACKNOWLEDGMENT

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Civil Defense

Proper Handling of Mass Casualties During a Major Disaster

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CARE OF THE WOUNDED is a very important phase of Civil Defense. In connection with the proper planning and preparation for the treatment of mass casualties during a major disaster we must consider the problems which will obtain under the worst possible conditions—that is, enemy attack with thermonuclear weapons. This will present the new problems of the radiation syndrome and residual radioactivity in the areas about the site of the target. The number of dead and injured, in a heavily populated region, will be in the hundreds of thousands. If we can cope with this emergency, problems presented by disasters of other types will be of a relatively simple nature.

There will be a great shortage of trained personnel, supplies and facilities necessary for the proper care of this huge number of casualties. Consequently the medical and health services will utilize all physicians, dentists, veterinarians, nurses and technical health personnel available. Conditions under which treatment is given will of necessity be primitive. It should be realized that the specific treatments of various types of casualties will depend upon the supplies and equipment available in the civil defense medical units and first aid stations. These supplies and equipment may not permit a physician to treat patients as he is accustomed to do in his regular practice. Uniform minimum procedures must be followed. Speed in treatment is essential. The use of supplies must be kept to a minimum.

Before medical and health personnel mobilize or enter the damaged area following an atomic or thermonuclear explosion, clearance must be obtained from Radef.* This may be given within the matter of minutes or perhaps not for days. A time lapse of the latter magnitude will result in the death of a large number of wounded from causes which would have been remedial if seen early.

The specific function of first aid stations includes receiving, sorting and classifying casualties according to the nature and severity of the injuries; decontaminating casualties; administering first aid and giving initial professional care; preparing, maintaining and transmitting casualty records and reports; routing of casualties; maintaining medical and surgical supply support of all first aid system groups; and later serving as outpatient stations for continuing or following care of sick and injured people.

The casualties should be sorted immediately upon arrival at the first aid station. The physicians at the station should:

(a) Quickly sort casualties into the following three groups:
   1. Hopelessly injured
   2. Seriously injured
   3. Injured

(b) Start emergency treatment for seriously injured first

(c) Supervise treatment generally

(d) Direct disposition of doubtful cases

The physician's judgment in the disposition of casualties should be influenced by the general condition of each casualty, need for immediate resuscitation, extent and type of injuries, time required for emergency care, possibility of delayed treatment, presence of chemical or radiological contamination, and other factors. Many ambulatory casualties will have only slight injuries and should not be permitted to interfere with the care and prompt movement to hospitals of seriously injured casualties. The following priority schedule, or a similar one, should be established to control the flow of casualties into and out of a first aid station and for transportation to hospitals:

(a) Immediate life saving and rapid first aid care initiated at first aid stations and continued at hospitals, such as resuscitation and treatment of the following: severe hemorrhage, severe penetrating and crushing injuries of the chest and abdomen, and badly crushed and torn extremities.

(b) Immediate resuscitation, then rest, where no surgical operation or other care is required to save life within a few hours, including treatment for shock, small chest penetration, and the need for artificial respiration or administration of oxygen.

(c) Delayed definitive treatment initiated at stations and continued at hospitals for severe burns, compound fractures, joint penetrations and severe face or superficial wounds.

(d) First aid, if needed, with transportation to hospital for specialized treatment, for minor head

*Radiological Defense Service.

injuries, eye and ear injuries, vascular injuries and miscarriages.

(e) Delayed first aid and release to home or work, for contusions, lacerations, sprains, simple fractures and minor burns.

Radiation casualties without injuries such as those listed above should be evacuated to designated hospitals or outpatient services after decontamination. Radiation casualties with injuries falling into the above categories should be decontaminated and handled according to established priority. Casualties with chemical or biological contamination, with or without injuries, should be handled according to the priority established for injuries after being decontaminated and/or isolated. Where feasible, persons should be monitored before they enter the first aid station and, if found seriously contaminated, exposed body surfaces should be washed and clothing discarded.

Before instituting treatment of wounds a rapid thorough examination and questioning of the casualty, if possible, is important for the recognition of multiple injuries. It is easy to overlook injuries in the seriously wounded unless the clothing is removed. This knowledge of multiple injuries makes possible the differentiation between those requiring primary and secondary consideration.

Emergency treatment of casualties in any disaster is begun in the field by the rescue workers at the scene of injury. Treatment is limited to resuscitation and first aid measures. If narcotics or large doses of sedatives are given to "walking wounded" who are expected to make their own way out of the disaster area, the majority of them will be converted to litter cases. Most emergency treatment will be carried out in the first aid station. This will consist of providing adequate airway; controlling hemorrhage; relieving pain and treatment of shock with plasma, plasma volume expanders or electrolyte solutions; closing sucking chest wounds; applying splints and dressings; administering tetanus prophylaxis; and starting chemotherapy. Casualties will then be evacuated to nearby existing or improvised hospitals for continued resuscitation and surgical treatment.

SHOCK

Shock can be expected after any severe injury. Except after massive hemorrhage, the fully developed picture of peripheral circulatory collapse associated with a fall in circulatory blood volume may not appear for several hours. Consequently the factor of time is of paramount importance in treatment of shock. The longer shock persists, the greater is the danger to the vital organs from anoxia and the more difficult it is to reverse the process and insure recovery. Shock may be recognized by: cool moist skin, pale and cyanotic lips, progressive weakening of pulse, falling blood pressure, thirst and restlessness, collapsed peripheral veins, and depression of urine formation. The majority of cases of shock are the result of hemorrhage, burns, trauma or dehydration and are characterized by reduction of blood volume. The rapid restoration of blood volume is the main goal of therapy in such cases.

The steps to be taken in the treatment of wound shock are as follows:

Stop hemorrhage. External bleeding can usually be controlled by pressure bandage or by maintaining constant pressure. Tourniquet is rarely needed. If used, apply just above the site of the hemorrhage and release after 45 minutes and reapply only if bleeding recurs. Tag and print T on the forehead. Clamp and ligate bleeding vessels whenever feasible.

Maintain adequate airway. Tracheotomy should be performed whenever there is doubt as to the adequacy of respiratory exchange and especially in the case of casualties with severe head injuries.

Elevate foot of bed or stretcher 12 inches. This may be contraindicated in head injuries, pulmonary edema or chest wounds if severe respiratory distress is present.

Conserve body warmth. Apply blankets above and beneath the patient except in very hot environment.

Relieve pain and anxiety.

Restore blood volume. This is the most important step in the treatment of shock, and whole blood is best suited for this purpose. When whole blood is not available plasma and plasma volume expanders such as gelatin, dextran and polyvinylpyrrolidone (PVP) may be used to sustain an adequate, but not necessarily normal, blood volume and blood pressure. When plasma and plasma volume expanders are given after massive hemorrhage, anemia will persist and will necessitate transfusion as soon as blood is available. Intravenous infusion of saline solution is even less effective than plasma and plasma expanders in restoring blood volume, for it does not replace the water-holding power of lost plasma protein. However, it may be the only fluid available and may sustain circulation up to an hour while blood, plasma or plasma substitutes are obtained.

WOUNDS IN GENERAL

There are two kinds of wounds—open and closed. The open wound is visible. The closed wound, for example a ruptured spleen, liver or intestine, may be easily missed and more immediately fatal. None of the open wounds are clean wounds. Due to the inevitable time lag between occurrence and treatment in a major disaster, all these wounds must be considered as infected and treated as infected. The type of

wound influences the method of treatment. *Abrasions* for the most part will not be treated due to lack of personnel, facilities and supplies and because of more important types of wounds requiring care. With *incised wounds* there is usually little or no damage to surrounding tissue. They should be washed with soap and water and a dressing applied. Primary suture should be performed only on wounds of the face or scalp. *Contused and lacerated wounds* require excision of damaged tissue in addition to removal of contaminants by gently washing with soap and water and irrigation with saline solution. *Penetrating wounds* present the problem of foreign bodies, in addition to contamination and damaged tissue, creating a still further demand for excision. In *perforating wounds* of an extremity it is usually advisable to excise the skin and subcutaneous fat at each opening and not to excise the remainder of the tract and muscle unless pronounced hemorrhage is present. The tract may be washed through with normal saline solution if this is possible without exerting pressure. *Avulsed wounds* present a grave problem because frequently the flap dies unless treated as a graft. The procedure is to cut away all fat from the free skin flap and remove the normal exposed fat down to the deep fascia and resuture the skin in place as a full thickness graft.

Debridement or, better, *excision of the wound* means enlargement of the wound so that all tracts are laid open, sharp excision of all devitalized tissue, removal of all foreign bodies and hemostasis; the whole being accomplished with gentleness under constant irrigation with normal saline solution. The excision of the wound requires time, effort and extreme carefulness. Anesthesia is necessary. The wound should be packed with gauze and the surrounding skin cleaned up to the margin without further contamination of the wound. The skin is shaved and scrubbed with soap and water; grease is removed with benzine or ether. The pack is removed from the wound and any evident small foreign bodies are taken out. The wound surface is then scrubbed thoroughly, generally with soap and water with a free irrigation with normal saline solution. Excision is then commenced and an attempt is made to keep the excised area in one piece. Preserving healthy skin is important. All devitalized muscle is cut away, tendons or nerves are washed if necessary but not sacrificed, and soiled periosteum is cut away. Portions of bone which have dirt ground into them are cut away sharply. Bone fragments which have the slightest attachment to soft parts should be left in unless they are too badly contaminated.

All hematomas encountered must be evacuated. Contaminated blood clots and hematomas are comparable to masses of devitalized tissue as far as obtaining the desired result from excision is concerned. They constitute an excellent culture medium. Whenever bleeding does not stop readily and completely with the use of pressure by warm gauze compress, the vessels should be ligated with fine suture material.

The wounds are left wide open and packed. This does not mean stuffing in large amounts of gauze under pressure as for uncontrollable hemorrhage. Rather, one or a few layers of fine mesh dry gauze are laid between the raw edges of the tissue, particularly separating any deep crevices. The idea is that there shall be no spaces shut off so that fluid and blood may collect as a medium for the growth of bacteria. Leaving any dead space in either sutured and unsutured wounds is to be avoided. The wounds may then be closed after five to ten days, when there is no evidence of infection, in a hospital. Following dressing of the wound, a smooth compression bandage is applied. This will help prevent edema and formation of dead spaces. Immobilization is of great value in injuries of soft parts as well as in fractures of bone. Healing is more rapid and timely and the patient more comfortable. Scar tissue is less and it is a prophylaxis against infection. In minor wounds, adhesive plaster and bandages are sufficient. In extensive muscle damage or bony injury it is of primary importance to have as complete soft part immobilization as can be obtained, that is, by plaster of paris splints or traction. Otherwise, each movement of the part is liable to mobilize or spread infection.

Some patients will be brought in with badly infected wounds. The wounds should be inspected, adequate drainage provided and antibiotics started at once. If true gas gangrene is present (clostridial myositis), the treatment will vary with the stage of the infection and the supplies available.

HEAD INJURIES

If the casualty presents a compound fracture with or without depression and with evidence of underlying brain injury as indicated by progressive loss of consciousness and lateralizing neurological signs, operation becomes mandatory. However, this cannot be performed until full neurosurgical facilities are available. It will be the responsibility of those in the first aid station to:

1. Maintain circulation by treating for shock.
2. Provide an adequate airway. Perform tracheotomy if necessary.
3. Control temperature if above 102° F. This may be done by removing clothing, applying wet packs and/or giving aspirin per rectum.

4. Maintain adequate fluid balance.
5. Transfer to a hospital as soon as possible.

EYE INJURIES

Eyes may be irrigated with water for chemical burns. For lacerations of the eyeball, penetrating wounds due to foreign bodies, etc., sterile dressings should be applied to both eyes and the patient evacuated to a hospital.

CHEST INJURIES

Injuries to the chest may be classified as rib fracture, crushed chest, penetrating and perforating wounds.

Rib fracture may be single or multiple. Usually the fourth to tenth ribs are involved. In treatment of mass casualties, strapping will probably be the only method possible in the early stages. However, this is unphysiologic because it reduces respiratory movement. Narcotics may also be given, but doing so reduces the cough reflex. Wherever possible, the treatment of choice would probably be intercostal nerve blocks which usually consist of the injection of 3 cc. to 5 cc. of 1 per cent local anesthetic agent at the angle of the rib, and injection for each rib fractured.

Pneumothorax requires watchful management, especially if one does not employ some method of constant removal of air. If closed, pneumothorax is usually due to a laceration of the lung or to bronchopleural fistula. The air may be removed by needle for diagnostic purposes, especially in doubtful cases, and especially if the patient is having respiratory distress. This nearly always gives the patient relief. If the improvement is only temporary, an intercostal catheter should be inserted in the sixth or seventh interspace in the posterior axillary line and attached to a water seal drainage bottle or, if that is not available, to the finger of a rubber glove after removal of the tip in such a way as to form a flutter valve. The lung must be expanded as soon as possible in these conditions because if expansion is delayed complications occur. If open pneumothorax, or sucking wound, is present, one should occlude the wound with a large firm dressing and then insert a thoracotomy tube and connect it with a water seal drainage bottle or flutter valve. Definitive treatment to the wound should be given only after the patient's condition improves. Crush injuries of the chest are those in which the wall is "staved in" so that it loses its rigidity and becomes a "flail" chest. This usually occurs from compression injuries of the thorax where adjacent multiple ribs are fractured, at least in two places, especially anteriorly, and the sternum loses its mooring. Paradoxical respirations occur along with pain. Intercostal nerve block relieves the pain and makes the respirations easier. Rib immobilization by means of traction, using towel clips clamped about the rib ends and connected to an overhead frame with enough weight (about three to five pounds) to stabilize the chest, will improve respirations.

Penetrating and perforating wounds of the chest. In treating these wounds, one must first combat shock, then stop hemorrhage and, thirdly, tamponade sucking wounds. Clean wounds may be closed; ragged wounds should be debrided. If shock should continue in spite of good treatment, one should look for progressive bleeding in the chest, tension pneumothorax, obstructed airway, great vessel injury or cardiac tamponade. Early thoracentesis is important for the diagnosis and treatment. If there is significant amount of air or blood obtained by aspiration, then under-water tube drainage should be instituted. This is a good guide as to whether or not the bleeding is continuing and also gives an accurate estimate of the amount of blood lost. Most often the bleeding that occurs is from the intercostal or internal mammary arteries. It may require ligation. Obstruction of the airways may be prevented by placing the unconscious patient on his side or by lowering the head of the table. If obstruction is suspected, tracheotomy should be performed. Great vessel injury is more likely to result from wounds above the clavicle or sternum, and injury of this kind necessitates early operation.

Cardiac tamponade can cause shock. In the diagnoses of cardiac tamponade, one should consider the position of the wound of entrance, neck vein distention and muffled cardiac sounds. Immediate pericardial aspiration is required and if blood is obtained, the diagnosis is confirmed. Aspiration may be performed from below upward at the angle between the costal cartilage and the xyphoid process or directly through the fourth or fifth intercostal spaces just to the left of the sternum. If there is general improvement after aspiration, the patient can be treated conservatively and observed closely. If shock is unchanged after a successful tap, or if improvement is only temporary, then surgical intervention with repair of the wound is indicated.

The semi-sitting position is tolerated best by patients with chest injuries. Morphine should be used in small doses. Oxygen, if available, is urgently indicated where circulatory collapse is present.

ABDOMINAL INJURIES

Injuries of the abdomen if open or penetrating should be treated by applying a simple massive sterile dressing. No attempt should be made to re-

place viscera, remove foreign bodies or manipulate or explore the wound. Treatment for shock should be given, a nasogastric tube should be inserted, if available, and chemotherapy started. Casualties with nonpenetrating wounds of the abdomen should be treated for shock and given nothing by mouth. Patients with abdominal injuries have high priority for evacuation to a hospital.

FRACTURES

A casualty with a fracture may present respiratory embarrassment, hemorrhage and shock. These complications of wounds demand first attention. One should depend on pain, loss of function or deformity for the emergency diagnosis of fracture and should not try to obtain crepitus or false point of motion. If fracture is suspected, the casualty should be treated as if the diagnosis of fracture had been confirmed.

Immobilization is the basic requirement in the treatment of a fracture. Casualties with fractures of the skull should be transported lying on the abdomen, with the face turned to the side to prevent aspiration of vomitus or blood. If the fracture is in the jaw, attention must be given to maintaining an adequate airway. Temporary immobilization can be accomplished with a circular bandage passed beneath the jaw to the top of the head, and held in place by another bandage from the forehead to the occiput. The teeth should not be held tightly together by the bandage if there is any reason to anticipate vomiting.

Meticulous precautions must be observed in moving a person suspected of having spinal injury, and additional care is imperative to stabilize an injured cervical spine. The neck must not be bent. The head must be maintained in a neutral position. This is best managed by having someone place his hands on either side of the casualty's head with his fingers supporting below the occiput and under the mandible and exerting slight but gentle traction. A board or stretcher is slid under the patient and the head, face up, is braced to prevent side to side motion. Casualties with fractures of the dorsal and lumbar spine are transported with the back up, on a board, with the head turned to the side. If there is the possibility of a broken neck, the patient should be transported as though fracture of the cervical spine were a certainty. If fracture of the spine is suspected, the motor and sensory status of the lower extremities should be noted. Casualties having progressive paraplegia should be evacuated immediately to a hospital for definitive surgical therapy.

The application of a sling with the elbow at a right angle and the binding of the upper arm to the body with a circular bandage will immobilize fractures of the shoulder, arm and elbow. Pieces of wood, metal, newspapers or cardboard may be utilized to splint fractures of the forearm, wrist and hand, which are then placed in a sling with the elbow at a right angle. In treatment of fractures of the lower extremity, traction with a Thomas-type splint is best and should be used for all fractures from pelvis through ankle. However, an adequate supply of these splints will not be available and the materials at hand will have to be used. A long wooden board placed laterally from the axilla to beyond the foot with another board from the buttock to the heel will keep the fractured extremity at rest. In cases where speed is essential and no material for a splint is immediately available, the two extremities may be bound together. If traction is applied, it should be sufficient to immobilize the fracture but not enough to reduce it. Care must be taken in the application of ankle or instep hitches to prevent pressure necrosis. They should be applied over shoes when possible.

A person with a fractured pelvis should be placed and kept on a rigid support, lying on his back. If the injury is severe, the thighs and legs should be bound together. The color of the urine should be noted, a specimen withdrawn by catheter if necessary. If the urine is bloody a catheter should be strapped in place as a drain.

Compound or open fractures should be treated as closed fractures except that the wound or protruding bone should be covered with a sterile dressing. A note should be made on the casualty's medical tag that the bone protrudes through the skin, since it may be pulled in by traction.

CRUSH INJURIES

Casualties with crush injuries should be treated for shock, given nothing by mouth, and given high priority for evacuation to a hospital.

BURNS

A large percentage of the casualties from explosion of fissionable materials will have sustained burns. These will be flash burns due to the explosion of the bomb and also deep and extensive flame burns of individuals trapped in debris during the ensuing fires. Burns occurring in such circumstances will often be associated with lacerations, crush injuries, or fractures which are sometimes more serious than the burn. Radiation sickness will also complicate the management of many patients.

At the first aid station a rapid thorough examination of each burned patient should be made and in-

formation recorded as to the extent and severity of the burn. Too much time should not be spent initially trying to determine the exact degree of the burn, except where necessary to decide whether there is a chance for recovery. The presence of respiratory tract burns, and the location, extent and degree of surface burns should be recorded on the casualty's emergency medical tag with a quick sketch of the burned area. Associated injuries should be carefully assessed and noted. The agent causing the burn (fire, flash, steam, chemical, electricity, etc.), if known, should also be recorded.

In order to best utilize the available resources, burn cases must be sorted according to severity and the care required. These casualties may be grouped as follows:

(a) Hopelessly burned casualties.
(b) Casualties with severe burns who may be saved by vigorous therapy.
(c) Casualties with moderately severe burns not immediately threatening life but requiring hospitalization.
(d) Casualties with minor burns suitable for ambulatory treatment.
(e) Casualties requiring only self-care.

The group considered as hopelessly burned includes all individuals with third degree burns exceeding 80 per cent of the body surface, and elderly individuals (over 70 years) with deep burns of more than 50 per cent of the body surface. Before consigning a patient to this group, the doctor must assure himself of the depth and extent of the burn and, if possible, obtain the opinion of another physician. Hopelessly burned casualties should be made as comfortable as possible and removed to areas where they will not interfere with the care of casualties who can be saved.

Casualties who can be saved by vigorous therapy are those with second degree burns involving 20 to 70 per cent of the body surface, and varying amounts of third degree burn. These casualties have first priority for transportation to hospitals.

Casualties in no immediate danger, but requiring hospitalization, are those with moderately severe second degree burns involving 10 to 20 per cent of the body surface, small areas of third degree, or third degree burns of the hands.

Casualties for ambulatory treatment in first aid stations are those with superficial burns affecting less than 10 per cent of the body surface.

Casualties requiring only self-care are those with just first degree burns and small areas (less than 5 per cent) of second degree burns. They should be instructed to treat themselves.

The successful treatment of burn casualties demands immediate initiation of an orderly pattern of management and close attention. A patent airway must be assured immediately. Tracheotomy is essential when laryngotracheal edema develops from inhalation of flame. Shock develops in from four to 24 hours after a burn due to reduction of blood volume resulting from loss of plasma-like fluid at the site of the burn. Sodium, protein and erythrocytes are lost and intense hemoconcentration follows. Blood volume must be restored. Formulas have been devised for fluid replacement. Simple rules based on severity and extent of the burn modified by the patient's clinical response are in order. This is indicated by thirst, pulse rate, blood pressure and urinary output.

For surface burns of less than 15 per cent, in the absence of vomiting and shock, oral treatment with hypotonic saline solution may be satisfactory. This solution contains a level teaspoon of salt and half a level teaspoon of bicarbonate of soda to a quart of water. This should be started gradually and increased to about one glass per hour. Intravenous fluid therapy with any available preparation should be started immediately in those patients with severe burns. Plasma, plasma volume expander, dextrose in saline, saline, or dextrose in water may be used, in that order of preference. The fluids received should be correctly recorded. The amount of fluid given in a 24-hour period should not exceed 10 per cent of the body weight.

No single routine is applicable to all burns. Choice of a method of local therapy depends upon the availability of medical supplies and personnel; the location of the burn; the presence and extent of complicating injuries, such as fractures, avulsions, lacerations, crush, etc.; the necessity for transportation; and environmental conditions. Local therapy of other severe injuries, such as major lacerations, penetrating wounds, compound fractures, injuries to large blood vessels, etc., should take precedence over burns in the initial phase. Shock always demands emergency treatment. Local debridement is minimal, consisting of the gentle removal of gross dirt. If no dressings are available, clothing should not be removed unless removal is necessary for decontamination. Burns associated with other injuries are covered with the standard burn pad (compress and bandage, gauze, field 22″ x 18″, 22″ x 35″) prior to evacuation for definitive care. Location of the wound should be noted on the casualty's emergency medical tag. All burn casualties requiring transportation should be protected with a sterile covering. Second degree burns of less than 10 per cent of the body surface with no contained areas of

third degree burn are dressed with a simple sterile covering or standard burn pad. The casualty is referred to a first aid station or hospital outpatient clinic for ambulatory follow-up care. No topical medication should be applied to burns. All severe burns of the hands should be dressed with the standard burn pad. Hands should be properly splinted in the position of function and kept elevated during evacuation.

Routine tetanus prophylaxis should be given promptly to all casualties with second and third degree burns, and particularly to those with complicating open wounds. While prophylactic chemotherapy is desirable, inadequate supplies of antibiotics will make it imperative to reserve them primarily for treatment of casualties with serious established infections and, secondarily, for the prevention of infection in the more severe burns.

It must be emphasized that priority for treatment and transportation will depend largely on the judgment of the physician in charge. No hard and fast rule is set up but, in general, the following order is recommended: massive hemorrhage; chest wounds, when there are serious signs of clinical shock and anoxia; shock; abdominal wounds; burns and crush injuries; and head and spine injuries.

This discussion of the handling of mass casualties during a major disaster may seem very elementary to some, but it must be remembered that *all* physicians will have to participate in the care of these casualties regardless of specialty. In case of attack by thermonuclear weapons, facilities will not be available or organization set up so that each may practice his specialty. First aid may be the only contribution physicians can make for many days after such an attack. On considering the number of casualties, the lack of trained personnel, the lack of facilities and the lack of supplies, one wonders whether it would not be better to treat the less seriously injured first instead of the more seriously injured, in order to get them back to work as soon as possible. This thought is contrary to the ethics of the medical profession but where national survival is at stake should be considered.

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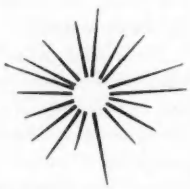

WITH WARNING

IMMEDIATELY REPORT TO YOUR CIVIL DEFENSE ASSIGNMENT

IF THIS IS NOT POSSIBLE, REPORT TO THE NEAREST MEDICAL INSTALLATION

WITHOUT WARNING

TAKE IMMEDIATELY AVAILABLE COVER. DO NOT LOOK AT THE BRILLIANT FLASH. IF IN CAR AND NO SHELTER AVAILABLE, STOP AT CURB, CLOSE ALL WINDOWS, TURN CAR RADIO ON, LIE ON FLOOR OF CAR.

AS SOON AS POSSIBLE CARRY OUT CIVIL DEFENSE ASSIGNMENT.

M.D.

WHAT TO DO?

KNOW YOUR C.D. ASSIGNMENT. LEARN ALL ABOUT C.D.

Civil Defense

Emergency Treatment of Burns in Mass Casualties

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MAJOR CATASTROPHES in the past rarely have resulted in more than a few hundred seriously burned surviving patients, and yet now in the light of new devastative factors, burn casualties in the tens of thousands must be anticipated in the event of a bombing attack upon us.

A gradual build-up of an accumulating casualty list cannot be expected. Rather, should attack come, within a few seconds the medical profession would be faced with the responsibility of caring for unprecedented numbers of severely burned civilians. Under such conditions individual therapeutic preferences must of necessity be modified by those standard procedures which would permit the maximum salvage of human lives. Even though certain acceptable methods of burn therapy as applied to small numbers of cases might yield better individual results than those to be discussed herein, nevertheless the shortage of medical personnel and of hospital facilities should preclude unrestrained therapeutic latitude.

Standardization of therapy and the "assembly line" technique may be quite distasteful to the American physician who has been taught to place a premium on individualization and the application of "custom built" principles in medical care. Ideal though this practice might be in peacetime circumstances, there are conditions of national disaster under which mortality and morbidity rates would be greatly lessened by the utilization of standard therapeutic principles. Furthermore in the usual environment of medical practice the patient for the most part remains under the care of a single physician, whereas under the complications of mass casualties a multiplicity of health personnel and a variety of professional competence would carry the therapeutic responsibility for those injured. Therapy initiated at the original medical installation would be continued along the chain of evacuation with a series of professional men and women contributing to the eventual recovery of the patient. In these circumstances the need for organization and a degree of standardization is evident. The physician obviously would have opportunity to apply good professional judgment even under the most rigid medical regimentation.

Three kinds of burns may be expected in the survivors of an atomic attack: First, flash burns developed almost instantaneously from the direct intense heat of nuclear reaction; second, burns from the spontaneous ignition of clothes due to this same direct heat; and, third, burns from the more usual causes such as burning buildings and other inflammable objects secondary either to spontaneous ignition or the blast effect with leaking gas mains or damaged electrical circuits. Although the cause of these thermal burns may vary the fundamental tissue changes and the basic principles of therapy are the same as those encountered in conventional civilian practice, depending primarily on the depth and surface area of the injury.

Heat waves created by nuclear reaction travel at the speed of light and in straight lines. Thus persons under cover at the time of the explosion should be protected from thermal burns resulting from nuclear reaction or from burning clothing. Light colored clothing affords more protection than dark, inasmuch as the latter absorbs much greater amounts of heat. This phenomenon was demonstrated in the bizarre burn patterns in the skins of the Hiroshima and Nagasaki casualties who were exposed directly to the atomic flash while wearing clothing with dark and light designs.

One of the important functions of the first aid station besides that of initial emergency medical care is that of triage. Unless good clinical judgment is applied in this matter the whole control of patient flow soon bogs down. Competent professional evaluation of the injured at forward echelons will lessen the load imposed on the evacuation system by sorting out persons with minor injuries as well as the hopelessly burned casualties and establishing an evacuation priority.

Patients with superficial burns involving less than 10 per cent of the body surface are given emergency care including mild sedation, if necessary, and instructed to report for further care on an ambulatory outpatient basis. The obviously moribund and hopeless casualties are made as comfortable as possible and then segregated in an area which will not impede patient care and evacuation. Any person with third degree burns involving 70 per cent or more of

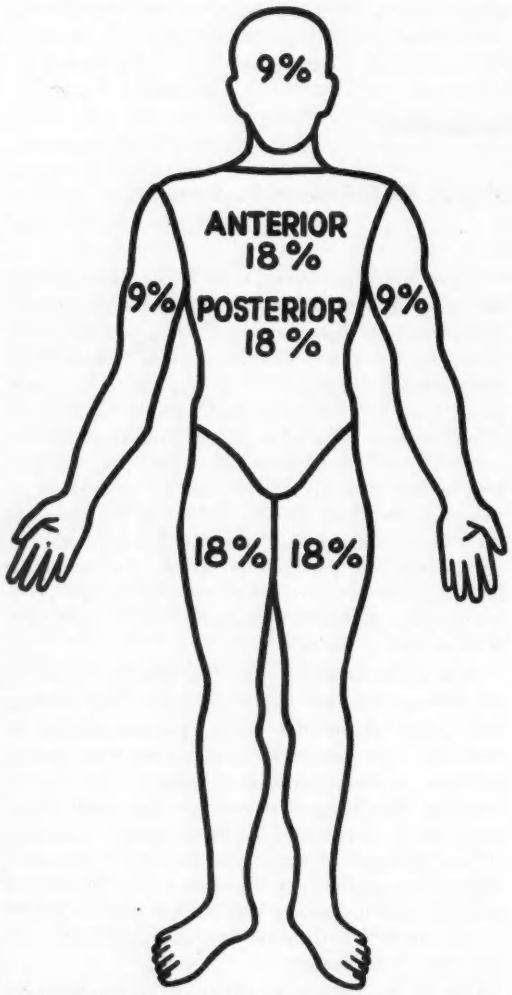

Figure 1.—"Rules of 9" for computing proportion of body surface area involved in burns.

the body surface may be considered hopelessly burned.

Activities of the first aid station are modified somewhat by the proximity and accessibility of supporting hospital facilities as well as the adequacy of medical supplies. In all events the basic treatment responsibility consists of the control of pain, protection of the wound from further contamination and the initiation of shock prevention and control. Although oversedation is to be condemned, the patient should be made comfortable. If necessary morphine sulfate is given in a 15 mg. dose. It must be remembered that poor absorption is associated with shock and repeated medication may accumulate to be released suddenly with circulatory resuscitation. Intravenous morphine will give rapid relief in circumstances in which poor circulation retards intramuscular or subcutaneous absorption.

The standard single-piece occlusive burn dressing (described later in this paper) is applied in order to prevent contamination of the wound and to make the patient transportable. If available, antibiotic prophylactic therapy is initiated, preferably in the form of procaine penicillin G, 300,000 units fortified with crystalline penicillin G, 100,000 units in oil. It is anticipated that this dose of antibiotic soon will be available in single shot disposable units especially for first aid station and field usage. The infusion of blood, plasma or plasma expanders is commenced, depending on the particular needs of the casualty and the proximity of the supporting hospital.

Rapid evacuation to more permanent facilities is of extreme importance in the stabilization of the seriously burned patient and as soon as the casualty reaches an institution where definitive care is available a planned program of therapy is inaugurated. Segregation of burn casualties in large rooms permits greater efficiency in the utilization of medical personnel.

BURN THERAPY IN THE ACUTE PHASE

The immediate management of the severely burned patient includes two therapeutic problems: First, the prevention and treatment of burn shock; and, second, the prevention of infection. The first problem involves the intelligent appraisal of erythrocyte, fluid and electrolyte balance, while the second embraces the neutralization of the hazards of infection both by the maintenance of adequate antibiotic levels and by the protection of the injured surface from further contamination. Much more important than the local care in treating a severely burned person is the immediate management of the systemic injury.

Systemic Therapy in the Acute Phase

Though there is not complete agreement as to the accuracy and efficacy of formulas proposed for estimating fluid therapy of extensive burns, nevertheless in circumstances imposed by the necessity for treatment of large numbers of casualties by personnel not always familiar with the problems at hand such a standard approach affords a common base line from which to commence a therapeutic program.

Many methods have been used in calculating replacement therapy for the seriously burned, most of which are estimates in relation to the percentage of total body surface involved. A simple and yet fairly accurate formula for determining surface area follows the rules of nine, wherein each of the upper

extremities comprise 9 per cent of body surface, the head and neck 9 per cent, each lower extremity 18 per cent, and the anterior and posterior aspects of the combined thoracoabdominal trunk each 18 per cent (Figure 1). In small children the percentages for the extremities should be decreased and those for the head and neck increased. Any patient having a burn involving more than 20 per cent of the surface is likely to go into some degree of shock, and a burn of 40 per cent or more is considered extensive and severe.

The depth of burn damage may be rather difficult to estimate at first examination. The initial findings of first degree burns are those of erythema and edema, while the early formation of blisters denotes at least second degree burns and possibly third degree. Burns of second degree are those in which the inner layer of epithelium survives, permitting regeneration, whereas in third degree burns the entire epithelial layer is destroyed.

An acceptable standard formula for the conversion of burned body surface percentages into parenteral fluid requirements is that of Evans,[4] which, when applied to a man weighing 70 kg. with a 35 per cent burn, calculates the first 24-hour fluid requirement as a total of 6,900 cc. broken down as follows: Whole blood, plasma or plasma expanders (70 times 35) 2,450 cc.; electrolyte solutions as Ringer's lactate or isotonic sodium chloride (70 times 35) 2,450 cc.; and 5 per cent glucose in water, 2,000 cc. In view of the dangers of water intoxication during the acute phase, one must administer the 5 per cent glucose with caution, taking into consideration such factors as the patient's size and total fluid intake. Half of the calculated amount of whole blood, plasma or plasma expander and half of the electrolyte solution and the same amount of 5 per cent glucose is given during the second 24 hours. After the first 48 hours the electrolytes of the burned patient usually can be stabilized by adequate amounts of fluid and food by mouth. One half of the fluids estimated for the first 24 hours should be given in the first eight hours and one quarter of the amount in each of the two following eight-hour periods.

Experience gained by the traumatic shock research teams in Korea showed that in using plasma expanders best results are obtained by the administration of one unit of dextran with each unit of blood. The total volume of electrolyte solutions should rarely exceed 4,000 cc. in the first 24 hours. This same limitation holds true for the total amount of blood, plasma and plasma expanders. Where it is necessary to supply large volumes of electrolyte solutions, it is advisable to utilize physiological solutions, such as Ringer's lactate, which approximate plasma in composition.

It must be remembered that no formula can supplant sound medical judgment as to the blood and electrolyte needs of the seriously burned patient. To the astute physician basic clinical observations such as the character of the pulse, depth and rate of respiration, muscle tone, skin texture and mental alacrity, will contribute substantially to the determination of patient needs.

Numerous more or less complicated laboratory tests are available to determine blood chemistry variations, most of which would be impractical in an emergency of wide scope. Even certain of these tests, such as the hematocrit determination in the face of hemoconcentration, do not necessarily present the true blood picture. A very simple and yet quite accurate index reflecting fluid balance and the adequacy of therapy is the rate of urine secretion. The average sized adult secreting 50 cc. of urine every hour is considered in good fluid balance. An hourly secretion of 25 cc. denotes a minimal satisfactory output, while more than 75 cc. per hour for more than three consecutive hours indicates over-hydration. If the rapid administration of adequate amounts of fluid in the face of a low urine output produces no urinary response the possibility of renal failure is considered. In this case fluids are cautiously restricted lest pulmonary edema drown the patient.

As soon as the burned patient can tolerate fluid orally, he should have available a modified Haldane's solution (3 gm. of sodium chloride and 1.5 gm. of sodium bicarbonate per liter of water). An approximate and very satisfactory formula to remember is one level teaspoonful each of sodium chloride and sodium bicarbonate per quart of water. A seriously ill patient may not tolerate oral fluids the first few hours but usually will take adequate amounts during the second day. The oral administration of alkaline solutions is discontinued after the third or fourth day as soon as the electrolyte balance has been stabilized.

Moyer[7] brought attention to the danger of water intoxication which follows the oral intake of drinking water during the early critical period. Thus during the first 48 hours, despite the patient's thirst, cracked ice, cold tap water, milk and fruit juice are denied. Fruit juices are high in potassium content and may complicate electrolyte balance if administered prior to the period of normal kidney function.

Systemic therapy during the acute phase includes prophylactic chemotherapy. Procaine penicillin G, 300,000 units fortified with crystalline penicillin G, 100,000 units in oil, is given intramuscularly every 24 hours, or aqueous penicillin G, 500,000 units intramuscularly every 12 hours. Should the oral

route be preferred or mandatory, then aureomycin, terramycin or chloramphenicol is given in doses of 500 mg. every eight hours instead of penicillin. Antibiotic therapy is discontinued after the first few days unless there is evidence of infection. If established infection is observed then, whenever facilities are available, sensitivity tests are carried out to determine specific therapy.

All burn casualties must receive prompt tetanus prophylaxis. This is even more critical when open wounds complicate the picture. If the patient has had tetanus toxoid a booster dose of 1 cc. is given. One may take for granted previous tetanus immunizations if the patient has had service with the armed forces. Those who have not had immunizations are given 3,000 units of tetanus antitoxin after the appropriate skin tests.

Local Therapy in the Acute Phase

There are two major therapeutic measures now accepted for the local care of burns each having the support of highly qualified scientists. One, known as the occlusive pressure dressing technique, is described by Allen and Koch[1] and the other is the open-air or exposure method advocated by Kyle and Wallace[6] of Edinburgh and supported in this country by Pulaski[8] and Blocker.[2] Most present-day forms of burn therapy are modifications of these two basic methods. No single therapeutic routine is applicable to all burns, for there are many modifying factors which will influence individual technique.

The exposure method lends itself best to injuries such as flash burns involving only one side of the body, burns of the face and burns of the buttocks and perineum. The advantages of the closed method are prevention of further contamination, a certain degree of splinting from the bandage, and transportability of the patient. Burns of the hand are pressure bandaged in the position of function for at least 48 hours. Involved knee and elbow joints are maintained in positions of extension and the involved extremity elevated. Old infected, granulating surfaces are always covered.

In the emergency of mass burn casualties the shortage of medical personnel and supplies may give little room for choice in the matter of preference of therapy and of necessity force utilization of the exposure technique in the vast majority of cases. Thus it is of the utmost importance that all physicians familiarize themselves with the application, advantages and disadvantages of this method of burn therapy.

The primary step in local therapy whenever possible and regardless of the specific after-care, is the removal of gross contamination with liquid detergent and copious saline solution irrigations. This is done with aseptic technique and precautions. In extreme emergencies due to the magnitude of the number of casualties this procedure may be impossible. In such circumstances the best that can be done is to make every effort to prevent further contamination.

The Occlusive Dressing. Emergency dressings of a single-piece type have been devised by Allen and Evans under the auspices of the National Research Council for civil defense stockpiling. These are standard pads available in two dimensions of 22 inches by 18 inches and 22 inches by 36 inches, sterile packed with roller bandages of a semi-elastic consistency and safety-pin fasteners included. They are simple to apply to limb or trunk and afford a very rapid technique of burn coverage. The outer surface of this dressing is composed of water-repellent cellulose layers covering an intermediate absorbent filling and with an inner fine mesh gauze sheet which is applied directly to the unmedicated burn surface. The dressing is then secured by the enclosed roller bandage with even, firm pressure. A similar result is obtained, though with the expenditure of considerably more time and effort, by the application of fine mesh gauze layers covered in turn by mechanic's waste held in position by elastic bandages.

The burn dressings may be left in place for one to two weeks if there is no evidence of infection. Changes of dressings are made under aseptic conditions, using light anesthesia or analgesia as the case may require. Initial use of the occlusive dressing does not preclude conversion to the open-air technique of therapy. Patients may have burns dressed for transportation and then, after arrival at a suitable medical installation, be treated by the exposure method.

Exposure Therapy. After removal of gross contamination from the injured surface, patients undergoing this form of treatment are placed on sterile sheets with the burned areas exposed to the drying effects of the air. Room temperatures are maintained at an even level so that exposure causes no chilling. Usually within two or three days a thin, pliable protective crust forms which permits easy and comfortable handling of the patient. Whenever possible if the joints of the lower extremity are not involved early ambulation is encouraged. Daily inspection of the burned areas is necessary and as cracks develop in the eschar overlying joints or as liquefaction occurs along marginal areas, these are debrided and dressed with gauze in saline solution.

In the extreme pressures of emergency, seriously burned persons should be evacuated to satellite towns and segregated in hospital wards, gymnasiums or classroom halls where with the basic necessities of potable water, cooking facilities, optimum

room temperatures and freedom from insects a few physicians with adequate ancillary personnel could treat large numbers of burn casualties by the open-air method. As a word of caution, the very simplicity of the exposure method of therapy may be a danger, and, as Evans[5] warned, "become in practice a method of surgical neglect."

BURN THERAPY OF THE SUBACUTE PHASE

Arbitrarily the subacute phase may be considered as commencing with an improvement in the status of the patient manifested by stabilization of the blood chemistry and spontaneous diuresis. In the average patient with a moderately severe burn this will be observed on the third or fourth day after injury.

Systemic Therapy in the Subacute Phase

With the appearance of diuresis and the disappearance of gastrointestinal shock, an intensive dietary program is inaugurated in order to supply the anabolic needs for tissue repair. Blocker,[3] who contributed substantially to knowledge of the problem of protein catabolism in burn patients, advocated massive doses of vitamins, particularly the B complex and C, and high-caloric, high-protein forced feeding, by intragastric drip if necessary. His studies showed that burn patients enter a negative nitrogen balance with large urinary nitrogen losses which may persist for two to three weeks. Unless this is vigorously combated by adequate nutrition, tissue regeneration is retarded and resistance to infection lowered. A patient of average weight suffering from a serious burn should receive at least from 300 gm. to 400 gm. of protein per 24 hours.

Constant reevaluation of the erythrocyte content level and the administration of whole blood transfusions as indicated will correct the chronic anemia of severely burned patients. This is quite important in the overall regenerative reaction of the body systems to injury and the preparation of the burned surfaces for successful skin grafting.

The prophylactic chemotherapy initiated on the day of injury is continued for approximately seven days. After that, if infection is present, specific therapy is determined by the use of sensitivity tests.

Local Therapy in the Subacute Phase

Whether the treatment is by occlusive dressings or the exposure method the eschars over third degree burns are removed the second week and the underlying granulation tissue prepared for skin grafting by the use of saline dressings. The exposure therapy is not continued for more than three weeks even though the eschar remains intact and there is no evidence of infection. Inasmuch as the problems of skin grafting do not fall within the scope of emergency care this particular phase of burn therapy will not be discussed.

REPORT OF A THEORETICAL CASE

A man 47 years of age was attempting a last-minute evacuation of household effects and at the time of the atomic explosion was in the open, stripped to the waist, facing ground zero. He had flash burns of the surfaces exposed to the blast.

One hour later he was treated at a mobile aid station where a one-piece occlusive dressing was applied to the anterior aspect of the trunk and similar dressings encircling each upper extremity. A hypodermic injection of 10 mg. (1/6 grain) of morphine sulfate was given as well as an intramuscular injection of procaine penicillin G, 300,000 units fortified with crystalline penicillin G, 100,000 units in oil. Due to the heavy casualty load the patient did not receive parenteral fluids.

The patient arrived by truck at Suburbania Hospital, located 25 miles from ground zero, two hours later (three hours after injury). The triage team in the hospital receiving room assigned the patient to the nursing school gymnasium adjoining the hospital, this space having been designated as the hospital burn center.

Immediately on admission, because of severe pain the patient was given 10 mg. (1/6 grain) of morphine sulfate. Dextran was commenced intravenously in one forearm and Ringer's lactate solution in the other. Blood was drawn for typing and cross-matching. A self-retaining catheter was inserted into the bladder and a charting system established for the recording of hourly urine secretion and parenteral and oral fluid intake.

An hour after admission the patient was taken, with infusions running, to the improvised surgery where, under aseptic precautions, the dressings were removed and the burned surfaces cleansed of gross contamination by the use of ample saline solution irrigations. Approximately 70 per cent of the involvement was second degree in type and 10 per cent third degree. The surface areas estimated included the anterior aspect of the trunk as far inferior as the umbilicus (13 per cent), and the anterolateral portions of both arms (3 per cent), the dorsum of both forearms and hands (4 per cent), and the face and portions of the anterior surface of the neck (3 per cent). Thus the total area burned was approximately 23 per cent of the body surface. The hands were wrapped with pressure dressings, being maintained in the anatomical position. The remainder of the burned surface was treated by the exposure method.

The patient was returned from surgery to a bed remade with a sterile laparotomy drape sheet. Calculations based on an estimated body weight of 65 kg. and 23 per cent surface area involvement gave the blood, plasma and plasma expander requirements for the first 24 hours as (65 times 23) 1,495 cc., and the same amount of electrolyte solutions

plus 2,000 cc. of 5 per cent glucose. Approximately half of this total of 4,990 cc. was charted for infusion during the next six hours inasmuch as four hours and a half had already elapsed since injury.

Because of previous immunization during service with the armed forces the patient was given 1 cc. tetanus toxoid booster injection.

The first hour after catheterization the urinary secretion was 15 cc. but by the second hour this had risen to 22 cc. and by the sixth hour to 45 cc. Up to this time the patient had received 500 cc. of dextran and 500 cc. of whole blood plus 1,000 cc. of Ringer's lactate and 500 cc. of 5 per cent glucose. During the remainder of the first 24 hours 500 cc. of dextran and 1,000 cc. each of Ringer's lactate and 5 per cent glucose were infused while the urinary output fluctuated between 40 cc. and 60 cc. per hour, showing fluid stabilization.

The patient demonstrated gastrointestinal normality early in the second 24 hours and drank quite freely (2,500 cc.) of the alkaline drink (level teaspoonful each of sodium chloride and sodium bicarbonate per quart of water). Thus with a parenteral supplement of only 500 cc. of whole blood and 1,000 cc. each of Ringer's lactate and 5 per cent glucose, the urinary secretion was maintained at an adequate level. Large parenteral doses of vitamin B complex and vitamin C were added to the electrolyte solution. The daily prophylactic injection of penicillin was administered. On the second day the patient ambulated with minimal discomfort and throughout the day required only mild sedation.

On the third day there was definite urinary stabilization with a moderate tendency to diuresis. Hence the retention catheter was removed. The oral alkaline solution was discontinued and the patient placed on a high caloric, high protein (nitrogen) diet, with massive oral doses of vitamins, especially the B complex and C.

The daily routine laboratory tests performed on the fourth day revealed a decrease in circulating erythrocytes. Hence 500 cc. of blood was administered. The temperature remained normal throughout this 24 hours and there were no signs of gross infection. The prescribed diet supplemented by vitamins was tolerated very well.

The course from this day on was uneventful. Antibiotic therapy was discontinued on the sixth day. The patient was prepared for skin grafting on the twelfth day and the grafting was done three days later.

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Civil Defense

Dealing with Hysteria in Catastrophe

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LURKING AS A POTENTIAL THREAT, even as does the embolus or secondary hemorrhage that kills a patient following successful operation, is the ever-present possibility of the explosive-destructive or the passive-jelling types of mass hysteria as a complication of any major human catastrophe. The symptoms are reasonably well established, but the why and when of an outbreak are more difficult to determine. Quick reactions may occur following any real or imaginary terror, as in the sinkings of the *Lusitania* and the *Titanic*, or in a "War of the Worlds" phantasy. Mass hysteria may develop where expected, as seen by Father Siemes at Hiroshima,[7] and yet may never develop even with apparent equivalent stress, as the Civil Defense report of Britain[9] claims of the London blitz, "There never was a trace of public panic."

Such apparent hit-or-miss contagion, plus the peculiar, always-present personal threat (it could happen to me—tomorrow or even in the next moment) tends to clothe this disorder in a mystic miasma of confusion and the average physician is generally content to concern himself with the more mundane facets of emergency work and hope for the best.

That this attitude is unrealistic is demonstrated in every such situation—since the local physician turns out to be most qualified to prevent and treat this medical problem. Stripped of its terror, cleansed of its mystery and evaluated by routine medical method uncomplicated by psychiatric jargon, panic is a pure disorder of function with a rational psychophysiological basis and equivalent rational preventive and therapeutic potentiality.

What, then, is mass hysteria or panic? It represents simply an end reaction of fear—chronic or acute, individual or group—in which higher mental control patterns are disorganized and more primitive brain areas apparently assume control.

Mira[16] classified the developmental stages of fear into six categories:

1. Prudence and self-restraint
2. Concentration and caution
3. Apprehension and alarm
4. Anxiety or anguish
5. Panic
6. Terror.

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In the first three stages the patient is still in contact and retains some control. Then as fear increases, progressing almost like the action of an anesthetic, the controls are broken, and hostility, aggressive destruction, over-talkativeness and excitation develop. As true panic appears, Mira believes, physical action is directed from basal centers. The motor and parietal-occipital cortical areas must be partially functioning, however, since there is, in this phase, random motor activity with perception of gross objects, although there may be spotty or near total memory loss. This period equates roughly to the excitement phase of anesthesia.

In the terror phase, complete inhibition of the cortex develops suddenly, with stupor, apathy and inability to react to help oneself or others. Mira assumes that the word "terror" is derived from "terra" and in this state "the return to earth" has been completed. He believes such inactivation may be permanent and reported two cases of death. Cannon confirmed such terror deaths, and other reports support this theory.

Generally other authorities equate panic with Mira's stages 5 and 6—although recognition of phase 4 is vital in prevention treatment. Merloo[14] listed four phases: (1) Conscious fear; (2) chronic fright; (3) terror; (4) stupor. Merloo's phase 2, 3 and 4 equate roughly to Mira's last three groups. The American Psychiatric Association pamphlet *Psychological First Aid*[2] classifies the symptoms in a simpler fashion:

1. Individual panic (blind flight)
2. Depressed reaction (slowed down, numbed)
3. Overly active responses.

This last group generally corresponds to Mira's *Anguish* state, with the other two being easily equated.

These individual symptoms of increasing fear may also appear in groups of persons. Here each member of the crowd tends to pass through the phases of fear—slowly or almost instantaneously in patterns parallel to his associates. Again, as in anesthesia, the early stages tremendously increase suggestibility, and fear seems to produce an "hypnoidal phase" which actually makes it contagious. Indeed, mass hysteria must be considered the most contagious disease known to medicine if by con-

tagion we mean direct communication, but without physical contact or infection. Due to the increased susceptibility to suggestion, each person mimics his nearest neighbor, and in seconds a crowd may explode into decorticate panic activity, or become a passive stuporous mass. The old notion that a crowd is reduced to the mental function of its dullest member is wrong. A crowd may well be reduced to a level far below this—to a level whereby behavior is only directed by the basal brain centers, and action is simply reflexive without a glimmering of intellectual guidance.

Such reactions en masse produce behavior patterns easily diagnosed. Father Siemes[8] described an active pattern at Hiroshima:

> . . . Among the passersby, there are many who are uninjured. In a purposeless, insensate manner, distraught by the magnitude of the disaster most of them rush by and none conceives the thought of organizing help on his own initiative.

This reaction—a milling, running mob—is the kind a lay person expects. But more common in combat experience and in scientific reports are the findings of Hersey[10] and Father Kleinsorge[8] describing the same disaster:

> Many, although injured themselves, supported relatives who were worse off. Almost all had their heads bowed, looked straight ahead, were silent, and showed no expression whatever.
>
> To Father Kleinsorge, an Occidental, the silence in the grove by the river, where hundreds of gruesomely wounded suffered together, was one of the most dreadful and awesome phenomena of his whole experience. The hurt ones were quiet; no one wept, much less screamed in pain; no one complained; none of the many who died did so noisily; not even the children cried; very few people even spoke.

Most frequently a mixed picture appears where both panic and terror states coexist as in U. S. Strategic Bombing Survey. Report on Hiroshima[18]:

> . . . There was no organized activity. The people seemed stunned by the catastrophe and rushed about as jungle animals suddenly released from a cage. Some few apparently attempted to help others from the wreckage, particularly members of their family or friends. Others assisted those who were unable to walk alone. However, many injured were left trapped beneath collapsed buildings as people fled by them in the streets. pandemonium reigned as the uninjured and slightly injured fled the city in fearful panic . . . There were physically intact teams on the outskirts of the city which did not function. Panic drove these people from the city just as it did the injured who could walk or be helped along.

Nonmilitary disasters can produce similar pictures and the Panic Control and Prevention manual[10] of the Office of Civil Defense of California describes many historical panic and terror patterns:

Iroquois Theater Fire: Panic behavior caused great numbers to perish in the Iroquois Theater fire in Chicago on December 30, 1903. The theater itself never burned, but hundreds of persons were crushed to death as a result of the actions of a panic-seized audience.

Lusitania: Crowd behavior on board the ill-fated Lusitania which was torpedoed without warning off the Irish coast on May 7, 1915, resulted in the loss of over one thousand lives. The crisis aroused a general sense of calamity and the passengers established a refuse-to-leave-the-ship pattern of reaction.

Titanic: The White Star liner Titanic struck an iceberg south of Newfoundland on its maiden voyage to New York City on April 15, 1912. It sank within two and a half hours. However, the sea was calm and only a few of the lifeboats were damaged in the collision. The behavioral reaction of the passengers led to the unnecessary death of more than 1500 persons through needless self-sacrifice. This represents the greatest maritime disaster in times of peace.

Such behavior certainly represents a profound disturbance of function, yet the symptoms are rapidly reversible and are comprehensible on a psychophysiological basis. It is easy to explain them as regressions—returns to more primitive and childlike behavior—and to suggest a purely psychological mechanism. Recent work by Selye,[17] Basowitz and co-workers,[3] Altschule[1] and others too numerous to mention has certainly demonstrated, however, an interrelationship between stress and body physiology that cannot be overlooked. Stress, acute or chronic, produces specific physiologic changes in every tissue and body cell. We have come a long way from Cannon's "fight or flight" theories and we now recognize multiple reactions to acute stress —in the cardiovascular, respiratory, gastrointestinal, urinary, endocrine, muscular and other systems. These new findings voluminously reported are not too pertinent, however, to this discussion, since individual psychosomatic symptoms are not mass problems. What is important is to realize that these omniform physiological changes, once launched, run their course and the problem is at that point as physical as it is psychological. We are as yet not at all clear on the cerebral reactions to all these changes, nor are we certain how brain activity is modified physiologically. Clinically, however, stress seems to produce a sort of anesthetizing action on the brain, curtailing frontal (control) lobe function. Then, spreading backward in inhibitory waves, it apparently blocks activity in the perceptive (parietal-temporal-occipital) areas and finally inhibits the motor centers. At this point the extra-pyramidal centers seem to take over and the patient simulates clinically a typical case of Parkinsonism, with masklike facies, bradykenesis and pill rolling tremor. Clinically this retrograde inhibitory spread from frontal cortex over the neopallium is most obvious and has been observed in thousands of combat cases.

Psychological factors seem more vital in earlier phases in determining who will and will not develop symptoms in a given stress situation. Obviously anybody—you, I, any human—will develop panic or terror if sufficient stress is applied long enough. But breaking points are highly variable from person to person and in any one person from time to time. Stress represents environmental pressure. Since our percepts of the environment reflect only our own personality structure, things that stress one may scarcely even annoy another today, but may befuddle him completely at another time. We can, however, work out a general etiologic sequence of fear, emphasizing that no one factor usually produces mass reactions but rather that there is a concatenation of pressure reactions interacting on variable personality patterns which suddenly catch fire in a panic state.

In handling individuals, of course, the basic personality is important in predicting fear reactions. In the mass, this factor is largely negated, since the hypnoidal hold of fear can render a mature person childlike in a fragment of a moment. Here other factors seem more important; and in catastrophe such factors as tension, insecurity and indecision or ignorance of what to do, seem most vital.

Tension, which is generally chronic and slowly builds up, is of course mostly found in combat situations but may develop as an aftermath of civil disaster such as repetitive earthquakes. In war, chronic tensions built by subtle propaganda, rumor or fear of attack may reduce a population to a "state of nerves" where even a minor incident sets off a panic reaction. Riots are typical examples of mass hysteria of this type—explosions generated following prolonged tension of one sort or other.

More important is insecurity. The "Invasion from Mars," Orson Welles' broadcast, burst on a peaceful not unduly tensional populace. Cantril's study of the public excitation shows that susceptible persons who reacted uncritically and in panic were:

1. Persons who rarely evaluated information—dogmatic, prejudiced, fatalistic persons who lacked standards of judgment.

2. Those who were unable to secure adequate information.

3. Those who were unable to fit the stress into an already established pattern of function—rigid persons.

4. Those who were passive and accepted as truth anything they heard.

Persons of these types, when their security is even verbally attacked, tend to erupt or freeze in panic-terror patterns. In true catastrophes verbal elements play a part, as do visual and other sensory stimuli. The sudden awareness of personal danger forced to consciousness by the widespread death and desolation of the A-bomb is stressed by survivors. Lack of confidence in leaders ("they don't know what they are doing"), success of attacking bombers, presence of dead and mutilated bodies, all add up to personal insecurity and panic.

A final general factor is ignorance—fear of the unknown. Night raids are notoriously more fearful than day raids; and struggling against an unknown enemy—perhaps an unseen one like "atomic drift"—increases feelings of helplessness and insecurity. It is difficult to mobilize one's strength even to face known odds; and bolts from the blue—unpredicted and incomprehensible—these break down the bravest. Studies by investigators in England show that the British soldier feared not the machine-gun which was actually most lethal, but rather cowered at the Stuka dive bomber which did not really kill many troops but was unnerving because of its unpredictability and the fact one could not fight back.

There are of course many other contributing pressures—fatigue, illness, malnutrition, for example—tension, insecurity and ignorance are the basic blocks of mass hysteria.

Somehow at first glance these stresses seem intangible and unmedical. What role does the physician play in their control? Here we are on firm ground: First, prevention; then, treatment.

Prevention of panic-terror states begins early. One of the great stresses is ignorance, and it can be overcome only by education. This means, in this specific situation, a comprehensive understanding of the problems of civil defense in relation to possible atomic attack. Some authorities[13] claim "that people only through becoming emotionally and psychologically involved in studying the facts and making individual decisions as to their roles in a disaster will develop the capacity to cope with whatever emergency arises." Physicians in California should know exactly what can, and, more important, what cannot happen. Security—that is, keeping information from an enemy—may be of military necessity at times, but it seems silly to perish merely because the secrets of survival are locked in a safe.

General education is also essential. Here the scare-type of propaganda must be replaced with facts—facts presented in combination with constructive evaluations presented authoritatively by the medical profession. Most persons have learned that a cut artery soon produces fatal hemorrhage. This information can be frightening. We do not feel so insecure, however, if with the information comes constructive suggestions on how to render first aid. This is the psychological approach we must use with atomic information: What will it do? What can we do? Useful techniques of this type appear in the Civil Defense news[6].

Three tips on how to reduce the threat of panic were recently offered local [Los Angeles] Civil Defense Officials by Dr. Frank Fremont-Smith, internationally known psychiatrist and consultant to the Air Force on dynamics of human behavior.

1. Explain to every citizen that even though A-bombs do fall in a given area his chances of survival are good. Instead of saying that two atomic bombs might cause "80,000 casualties" in a metropolitan area like Los Angeles, say rather that casualties would be "not more than two out or every 100 persons in Los Angeles County."

2. Emphasize the idea of mutual aid. "If residents of a stricken city know that residents of all other cities are well prepared and anxious to help, all will feel more secure."

3. Make sure each person knows he has a job to do. "From experience abroad we know that nothing does more to obviate threat of panic than a civilian defense set-up in which everyone, including children, is trained to perform a particular job. A small boy who knows it is his responsibility to have flashlights in good condition in his home seldom will panic."

Suggestion 3 introduces another prevention technique for physicians—learning a routine which can be followed even though cortically confused by fear. Over and over in combat one sees the soldier, even in a borderline panic state, repeat successfully functions learned in basic training. Here is the true reason for the repetitive, almost *ad nauseam*, drill of soldier, policeman, fireman or civil defense worker. The mere reading of posters is not enough. What counts is repetitive practice under simulated conditions until the action, whatever it may be, is successfully undertaken without conscious thought, since anyone may well lack capacity for conscious action as fear paralyzes his cortex.

Every physician (actually, in so far as possible, every person) should have a plan of prepared action. This plan should be plastic—almost nobody stays in the same place every hour of every day—and should be prepared to produce maximal feelings of security developed through prearranged action in all possible situations.

Worry about loved ones, about one's associates, about what is happening, can be lessened to some degree by such a scheme. Realizing that each person knows what he is to do, and is doing it, affords maximal reassurance for security. Cut off, across town from his family, a physician who knows his wife and children are following a safety plan will feel less guilt at carrying out his own prearranged commitments.

At this point information is again important. Battery radios—portable or those in an automobile—proved most useful in recent California earthquakes.[11] A knowledge of what goes on is reassuring and stifles rumors.

In quashing rumors, physicians can play a key role. In any disaster rumors act as tinder to potential "explosions" of masses of people. As a person of authority, doing his job, the physician can break up rumor by a simple query: "How do you know?" and by pursuing this point—"How do you know"—until the rumor-monger admits defeat, for obviously in the case of rumor no one can really know.

Finally, in prevention the physician should be concerned with the treatment of borderline panic states to prevent further infection of the group. Persons in anguish states should be treated and removed to more controlled areas or to hospitals. Tensional persons or groups should be spotted and assigned to useful work. Here the physician must recall the "flight or fight" theory and remember that if a person can do neither his physiological adaptative changes simply pile up and increase his tensions. Physical activity constructively directed is a most useful preventive of panic. Most physicians have always marveled at the doctors in motion pictures who at any time of stress, especially childbirth, put everyone in reach to boiling vast quantities of water—a most useless task, it seems, until one realizes it provides action and thereby mayhap reduces tension.

If panic patterns develop despite prevention measures, physicians can do much to help. It is conservatively estimated that in panic situations "simple measures well within the capabilities of any physician properly indoctrinated would make possible the return to the population of from 50 to 60 per cent of psychiatric patients."[4]

In the European Theater in World War II, psychiatric methods for use in combat areas were taught to hundreds of battalion surgeons in less than a week; and those physicians knowing only a few principles of psychiatric first aid, returned most of the soldiers in panic-terror states to combat without need for more complex therapies.

On the physical side the best medicines for prevention and treatment are food, fluids and rest; on the psychological side, reassurance. Mobile kitchens—hot soup (the omnipresent British army tea is typical) are of use in prevention and in diverting small groups in turmoil. Physical activities directed toward food preparation are useful outlets. A great deal of attention to this factor is fully warranted. Coffee and tobacco in ample supply are also staples of treatment and prevention.

Sedation is of value only in states of severe excitement. Here one must be most cautious, since small doses may simply depress further an already depressed cortex and precipitate an explosive reaction.[15] Persons in terror states can be taken to a safe place and given hot food. They usually are no problem since, like sheep, they follow directions easily and do not excite others. A truly excited

patient, however, must be sedated. Newer drugs such as rauwolfia extracts are as yet unproven, and while of possible advantage[12] may produce side effects. Drugs given by mouth are much too slow for treatment although of some use in prevention. Rapidly acting barbiturates have proven most valuable, and in panic excitements intravenous medication is the method of choice. Since the person is hyperactive, large doses are the rule; routine administration generally only confuses the patient and increases the excitement. Dosage varies with each drug, of course, but World War II experience suggests the use of such medication should be limited and administration and dosage should be based on actual achievement of definite sedation rather than on text-book dosage recommendations. Sometimes two to four times the routine amounts are required for such emergency sedation.

Crowds should be approached through education, with information given by loudspeakers or radios or even by persons who can speak effectively. As information of an accurate nature is presented, the panic will lessen as the people listen. Even nonreassuring data, if accurate, brings a crowd to reality thinking. Mira found that if evacuation was possible, people panicked; but when a city was surrounded and the people were told it was surrounded, they quieted and returned to their duties. Even knowing that death is a certainty seems preferable to not knowing anything.

Reassurance is naturally most useful for groups or individuals. Accusing or blaming is worse than useless. Information about fear—how it acts, why frightened persons or groups behave as they do—is a constructive approach. Reassurance predicting complete resolution of a patient's symptoms is most valuable in panic or terror states, especially if given during the administration of intravenous sedation. Explanations of situational problems and encouraging action rather than demanding control are approaches which give frightened persons confidence in themselves.

Equally important are the actions of the physician. By unfrightened manner and control he can infect a group in a positive reassuring fashion. The physician in this consideration must realize that as a person of authority he will often be the recipient of the displacement or projection of hostilities of many persons whom he has forced to face the grim realities of the situation. Scapegoating is a common pattern in such situations and may well be directed at the doctor. Panic and terror are an escape and the return to the present may be painful. Such hostilities, again, can be handled by information, reassurance and directing the person to some physical constructive action.

From the nature of this presentation thus far it might seem that the lessons of the medical school as to employing laboratory aids and routine medications are singularly unuseful in catastrophe. This is not true. The fact the physician knows what he is doing is impressively reassuring. He, at any rate, is not being jabbed by the horns of the present dilemmas. He knows his way and goes it.

If he can also expedite information and stop rumor he will be undercutting potential panic. As a doctor he emphasizes the need for food and fluid, for warmth and reasonable rest and administers necessary sedation. He utilizes his years of clinical experience in comprehending the querulous antagonisms of people who are distressed and in resolving their physiological pressures in constructive action. Certainly what he does medically and surgically in treatment is vital for survival of the injured. By adding a little psychological method to his armamentarium, he may be able to also avert a major catastrophe, or at any rate provide for a feeling of security and well-being in those whom he contacts—a feeling that at times is more vital than well bandaged wounds.

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Civil Defense

Procurement and Use of Blood, Blood Derivatives and Plasma Expanders in a Major Disaster

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On June 15, 1955, a major attack by enemy aircraft was made by surprise on California. The invaders succeeded in reaching their targets and dropped atomic bombs on the large cities. In one city alone, it was reported that 180,000 people were killed and 177,000 were casualties. The combined total was approximately 40 per cent of the inhabitants of that city. Other urban centers suffered equal destruction. Fortunately, the above statistics are only the realistic figures tabulated by the Civil Defense authorities after the simulated attack.

The hypothetical destruction of the city, the bleak desolation, and the tremendous loss of life are impossible to envision; but the figures cited are probably quite factual, as they are based on findings obtained by the actual past use of the smaller weapons of destruction. If the largest bombs which are now available had been dropped, it is conceivable that the killed and injured would more closely approximate 60 to 80 per cent of this state's population. If such a catastrophe occurred, thousands of our people would die for the very simple reason that there would not be enough blood instantly available to care for them. Blood is outdated after 21 days, and the stocks that would be in the ice boxes of blood banks would probably be destroyed or contaminated. We must assume that there would be very little usable whole blood in the entire state.

It is not intended that this short article should exactly define the specific uses of blood, plasma, other blood derivatives, and plasma expanders. Every physician should know the full therapeutic value of these different transfusion commodities. We recommend a refresher perusal of one of the recent books written on transfusion therapy. Physicians who served in the last war know full well the tremendous value of blood, plasma and serum albumin in the mass treatment of badly wounded service personnel. Suffice to say that if there is enough blood of the proper type in the proper place at the proper time, the likelihood of saving patients is tremendously enhanced.

A constant problem in blood banking is to create ways and means to make sure that no person in peace or war shall die because of the lack of blood.

President of the California Blood Bank System.

The chart on the adjoining page presents a condensed table on the usage of blood and its derivatives.

The population of California now is 12 million. Supplies of blood available for therapeutic purposes are adequate and are conveniently placed. Approximately 310,000 units of blood are used per year. There are 12 banks operating within the framework of the California Blood Bank System, two Red Cross Regional Blood Centers, several small hospital blood banks, and three commercial laboratories currently drawing blood for use in the state. Los Angeles and Orange counties with their combined five million are the areas which use the most blood at present. No state in the nation has a more completely integrated, coordinated blood coverage system than California, but like all medical ancillary public services, the blood program cannot remain static; it is not perfect, it is being continually improved.

Earlier planning in the location of blood banks is turning out better than could have been expected for they are widely dispersed throughout the length and breadth of the entire state. These banks mesh and interlock with each other. They serve definite territories and stand ready to implement their neighbor institutions' need for blood and thus provide better transfusion protection for all communities. This well-integrated plan has worked well, and for the first time in medical history it has made blood instantly available anywhere in California or procurable within a few hours. However, this system would break down under the stress and mass destruction incident to atomic bombings. Supplementary long range measures must be formulated speedily and effectively to solve this pressing problem.

The Federal Civil Defense Administration Bulletin No. 184 (dated May 24, 1955) estimates that the number of living casualties following an air attack on the five major target cities of our state would be over one million. The blood that would be needed during the first ten hours would be 100,000 units, from 10 to 72 hours 940,000 units, and from four to 21 days 1,150,000 units. This large figure equals the quantity of blood that now is drawn by all of

THERAPEUTIC CHOICE FOR USE INTRAVENOUSLY

A = First Choice , B = Second Choice , C = Third Choice , D = Fourth Choice , E = Fifth Choice

	WHOLE BLOOD		PLASMA			RESUSPENDED RED CELLS	HUMAN SERUM ALBUMIN	ANTIHEMOPHILIC GLOBULIN	GELATIN*
	fresh	preserved	liquid	frozen	dried				
SHOCK, HEMORRHAGIC	A	A	B	B	B	D	C		E
SHOCK, BURN[1] OR CRUSH SYDROME[1]	B	B	A	A	A		C		D
SHOCK WITH CEREBRAL HEMORRHAGE	B	B	C	C	A[4]		A[4]		D
SHOCK, MEDICAL[3]	B	B	A	A	A		C		D
ANEMIA, ACUTE	A	A				B			
ANEMIA, CHRONIC	B	B				A			
LEUKOPENIA[2] OR THROMBOCYTOPENIA[2]									
HYPOPROTEINEMIA, ACUTE[3]	D	D	C	C	B[4]		A[4]		
HYPOPROTEINEMIA, CHRONIC[2]									
CARBON MONOXIDE POISONING OR METHEMOGLOBINEMIA	B	B				A			
COMPLEMENT OR PROTHROMBIN DEFICIENCY	B	B[5]	A[6]	A[7]	A[7]				
HEMOPHILIA	B	C	B[6]	B[7]	B[7]			A	
IMMUNOTHERAPY	B	B	A[8]	A	A				

[1] Initial treatment
[2] No treatment with blood recommended
[3] Several causes (cf. text)
[4] Concentrated
[5] Stored less than 10 days
[6] Fresh liquid plasma
[7] Plasma quickly stabilized after collection
[8] Plasma stored less than 3 months

*Since the above table (taken from "Blood Transfusions" by DeGowin, Hardin and Alsever: W. B. Saunders Co., Philadelphia, 1949) was printed, the choice of gelatin for intravenous purposes has changed. Dextran and polyvinylpyrrolidone (PVP) appear to be more suitable in the role of plasma volume expanders.

the blood banks within the state in a three-year period. Realistic thinking can only conclude that a massive loss of life would result even if only a five megaton multiple strike were inflicted.

In order to show the tremendous physical plant and the great expansion of trained administrative and technical personnel that would be necessary in our blood banks to meet this challenge (presupposing that by some miracle the banks were spared), the following example is outlined (based on statistics from FCDA Advisory Bulletin No. 184):

1. If 1,150,000 units of whole blood are required four to 21 days (a 17-day period) following a major disaster of the five target areas:

(a) Approximately 67,647 units of whole blood would be required per day (24 hours).

(b) Approximately 2,819 units of whole blood would be required per hour.

2. If one team of 105 workers, using 20 beds, could draw and process 100 units of blood per hour:

(a) Approximately 28 teams (2,940 personnel) would be required to draw and process 2,819 units of blood per hour.

3. If three eight-hour shifts are required per 24 hours, and a different team is used each shift:

(a) Approximately 84 teams (8,820 personnel) would be required to draw and process 67,647 units of blood per day.

Based on the previously mentioned estimate of 177,000 casualties for one city alone (where blood bank has a present maximum monthly capacity of 12,000 units) the bank would have to increase its production 22 times in order to supply the estimated 265,500 units of blood required in a four-week period (1.5 units per living injured).

Blood banks in the past have grown, through necessity, to their present maturity in the larger population centers. This logical development was geared to the greatest source of donor supply and recipient demand. During peace, this is a good working relationship. However, during a massive bombardment from the air, or from any other large scale disaster, not only would the cities and towns be completely obliterated, but so would the large blood banks which now give these urban areas complete blood coverage. Seven of the largest banks are situated in the middle of our metropolitan zones and would, therefore, be close to ground zero. One bank is located at the periphery of epicenter, and two lie directly in the fall-out path. Only four blood banks might escape destruction. Two of these four are the smallest banks in the system, and the other two are listed as medium sized banks.

The logical deduction, then, is that the present large urban banks of the state would simply cease to exist just at the time when their commodity is most needed. It appears obvious that we should disperse these vulnerable blood banks and get them sufficiently far outside of the strike area in order that these facilities would not be destroyed and their trained personnel scattered. If this plan is not feasible, then we ought to organize and create satellite banks on the safe perimeter of the larger centers so that in case of need these satellite banks could go into immediate operation. To do this would require financing not immediately available. All 12 of our community, nonprofit blood banks are entirely dependent for their existence on the small service charge made for their services. They just do not have sufficient money to create such an all encompassing network of satellite banks, erected, equipped and staffed, even on a stand-by basis.

In California, communities differ widely from one another in topography, transportation routes, weather, food and water supplies, ease of speedy access to or egress from the area and even in the nationality of the inhabitants. Each site assumes a complexion of its own; hence any overall blueprint for a major disaster must be broken down to the needs of the particular locality. In some measure this is good for it places the responsibility directly on each community to do something for itself in planning, implementation and creating safety measures. Certainly this is true in blood banking. The rapid dispersal of the inhabitants of the central California valleys would be comparatively easy as contrasted to the impossibility of mass evacuation from the San Francisco area, where also the primary routes of escape run mostly into the dangerous fall-out areas to the southeast. It is fallacious to assume that each community will have four to six hours of warning before attack, permitting necessary medical blood procurement facilities to be removed to predesignated population collection centers along the escape routes where they could commence blood procurement as soon as the first onrush of escapees arrived at the holding stations. That does not take into account the hysteria, the confusion, the disorientation and the emotional behavior of the displaced people.

The California Civil Defense authorities have dispersed throughout the state over 32,000 units of blood plasma, 273,000 empty vacuum bottles with donor and recipient sets and adequate anti-A and anti-B typing serum. Augmenting this large reserve of plasma, the Federal Civil Defense Administration has stored within the state, for emergency use, 86,856 units of normal human dried plasma, a large quantity of vacuum bottles, donor and recipient sets, and a sizable amount of plasma volume expanders in the form of dextran and polyvinylpyrrolidone. These extensive stockpiles are now protected against ordinary bombings, but improved conservation plans are at present under way to make these valuable supplies even less vulnerable. In addition to the state and federal civil defense supplies, there are 5,200 units of plasma belonging to the blood bank sytem. These units are now strategically placed in various hospitals or in the banks' own storehouses.

The first ten hours following a major disaster are the most crucial. These few hours would see very little definitive medical treatment carried out. First aid would be the order of the day. Plasma, serum albumin and plasma expanders would be immediately utilized as these products are available in considerable amounts. The numerous first aid stations throughout the state have been equipped by civil defense, and all carry considerable supplies of these intravenous therapeutic agents. Accessory stores would be quickly mobilized and sent to the stricken areas.

If any whole blood is to be given during these critical early hours, it must of necessity come from sources outside the strike and fall-out zones. On them would fall the burden of drawing, checking and transporting blood on demand to the damaged areas. States adjacent to California, if unharmed themselves, would be called upon to augment the supply of blood, plasma and blood derivatives. This plan calls for an immediate close integration with the states surrounding ours to the east and north. Fortunately, both the California Blood Bank System's clearing house and the American Red Cross have established close reciprocity with the nation's blood banks.

On the bright side of the ledger are the following:

(a) Thousands of our people have previously donated blood. They are typed and carry their type card identification. The inmates of our penal institutions and state hospitals likewise are typed. This great reservoir of listed specific type blood would be available for instant use if the institutions were undamaged.

(b) Mobile procurement facilities are quite widely dispersed—a feature of great importance. They would be alerted for instant action.

(c) Some administrative and technical volunteer personnel have already been trained. This is particularly true of the two Red Cross installations, and as some of these volunteers live outside the critical strike areas, they would be thrown into action immediately.

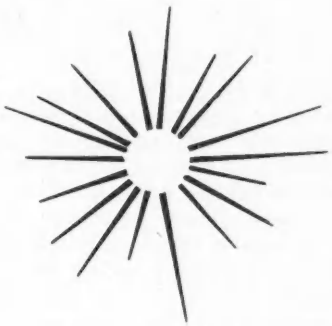
(d) A considerable stockpile of plasma and plasma expanders is instantly available. This enormous cache would be the first material to be used after the disaster.

(e) Adjacent states and the country at large would rally immediately and respond with blood and plasma. Certainly the entire nation would not be irreparably damaged. The American National Red Cross blood centers and other out-of-state blood banking agencies would instantly come to our aid.

(f) Refugees in the large collection and holding centers would be spot-checked and the type O blood drawn. In this early phase no attention would be paid to the Rh factor. Later, when some semblance of order was established, type-specific needs could be furnished on demand from these holding zones. If necessary, complete blood procurement teams would be flown in from outside banks.

To augment plans by which we might be better prepared to face major attack sufficient sums of money must be made available for the creation of a well coordinated blood bank administrative and technical training program, for the education of the population in disaster blood procurement techniques, and for the creation of an intermeshing network of widely dispersed satellite blood banks. Without this financial assistance, the blood bank system must necessarily run along on its present schedule—which is adequate for peacetime needs. Given sufficient monetary aid, real progress toward disaster expansion could be achieved.

384 Post Street, San Francisco 8.



WITH WARNING

IMMEDIATELY REPORT TO YOUR CIVIL DEFENSE ASSIGNMENT

IF THIS IS NOT POSSIBLE, REPORT TO THE NEAREST MEDICAL INSTALLATION

WITHOUT WARNING

TAKE IMMEDIATELY AVAILABLE COVER. DO NOT LOOK AT THE BRILLIANT FLASH. IF IN CAR AND NO SHELTER AVAILABLE, STOP AT CURB, CLOSE ALL WINDOWS, TURN CAR RADIO ON, LIE ON FLOOR OF CAR.

AS SOON AS POSSIBLE CARRY OUT CIVIL DEFENSE ASSIGNMENT.

M.D.

WHAT TO DO?

KNOW YOUR C.D. ASSIGNMENT. LEARN ALL ABOUT C.D.

Civil Defense

Public Health Measures to Be Taken in a Major Disaster

GEORGE M. UHL, *M.D.*, *M.S.P.H.*, Los Angeles

PREPARATION FOR DISASTER in any given community directly hinges upon the individual and collective strength of all the people within that community. Strengthening and bolstering the weak, the sick, the handicapped is essential to any plan or organization dedicated to the preservation of human life; and the effectiveness of medical care and public health programs afforded to all—from infancy to old age—would be harshly exposed in the crucible of widespread disaster.

To look at the role of public health in the eventuality of major disaster is to apply a telescopic lens to its day by day, year-round regimen of preventing or meeting lesser crises, lesser emergencies. Only the scale of disaster varies. By its very nature, a health department is a disaster-preventing, disaster-reducing, disaster-curbing endeavor.

Many volumes have been issued in the past decade giving model plans for the organization of every facet of civilian defense. In no city in the nation has the ideal been reached and maintained. The following description is not intended to be construed as the ultimate goal in public health preparedness for major disaster. Instead, it attempts to show the public health measures which could go into effect in the city of Los Angeles should disaster strike tomorrow.

Communicable Disease Control

One of the greatest responsibilities of a health department is the control, by whatever means found necessary and practicable, of communicable diseases which threaten the health and well-being of the members of the community. Early detection and identification of diseases and early clarification of the methods of dissemination are extremely important in minimizing the effects and reducing the spread of infection. Whether a given disease results from innocent induction into the population by one or more carriers or from covert attack with biological agents, the obligation of public health remains the same.

Epidemic intelligence, encouraged by the World Health Organization to guard against another pandemic occurrence of influenza, has become a vital part of routine communicable disease control as well as of protection against bacteriological warfare. In effect, epidemic intelligence is a slide-rule method, summing up the daily count of epidemic diseases the world over, adjusting for anticipated seasonal variations and analyzing the resultant totals for local and national areas and observing the global pattern. Supported by current data and precedent, a more accurate evaluation and a more predictable course can be accorded slight epidemic variations on the local scene.

Much of the success or failure of this method is attributable to the rapidity with which unusual or undiagnosed diseases, or suspected outbreaks of infectious disease are reported. A dramatic demonstration of epidemic intelligence combined with the communicable disease control forces of the community occurred in Los Angeles last year. In a two-day period a private physician reported two suspected cases of typhoid fever. These two reports, indicative of a possible impending outbreak, caused the immediate activation of the city's epidemic investigation and control forces which quickly pinpointed a wedding reception as the origin of outbreak, traced several hundred unlisted guests (some to points as far away as Hawaii), found the typhoid carrier, and succeeded in confining the threatened epidemic to eleven cases and one death, with no secondary cases developing among persons who came into contact with the exposed group.

An integral part of the epidemic intelligence program in Los Angeles is its network of "epidemiologic listening-posts." Throughout the elementary schools in the city, board of education nurses play the role of the epidemiological eyes and ears of the health department, particularly watching for unexplained or excessive absenteeism, detecting causes and reporting daily absences for comparison with previously observed norms. These "listening-posts" were alerted for possible concomitant reactions among vaccinated children in the recent poliomyelitis immunization program. If, as a prelude to war, pathogenic agents were insidiously introduced into any group or into the population as a whole, an effect would be promptly observed in the elementary schools.

City Health Officer, Los Angeles.

As part of its communicable disease control activities, the health department offers to private physicians laboratory services in performing diagnostic tests on specimens and cultures in which these procedures constitute an instrument of disease control. At 56 locations about the city, laboratory deposit-boxes have been established for the use of physicians wishing to send specimens to be tested. These specimens—primarily blood to be tested for the presence of syphilis, blood for viral disease diagnostic tests and specimens from throat, stool and sputum for culture—are collected on a regular daily schedule. In time of disaster, these pick-up locations, familiar to physicians throughout the city, would be immediately available in undestroyed areas as emergency laboratory collection stations.

Not to be overlooked is the continuous immunization program conducted by every public health department in an effort to build a large reservoir of persons who are immune to certain specific diseases. Teams of doctors and nurses who routinely participate in this program could be diverted during a disaster to areas where outbreaks of other contagious disease demand mass inoculation.

Water

Early this summer, a destroyer docked in the Los Angeles harbor at San Pedro. As a part of routine procedure, fire hoses were attached to the ship and the ship's salt water fire pumps were put into operation. For five hours beginning at midnight, thousands of gallons of the contaminated salt water of the inner harbor basin were pumped into the city water system by accident owing to a faulty backflow device. Within two hours after the first report, water mains were being flushed and chlorinating equipment was in operation. A cooperative effort between health department sanitary engineers and the city Department of Water and Power restored the water to customary purity in less than 20 hours. No disease was reported.

In the City of Los Angeles the health department alone spends more than 300,000 man-hours a year in the protection of public supplies of food and water and in the prevention and correction of those insanitary environmental conditions that may constitute a threat to the health of the people.

Food contamination, water pollution, rodent and insect infestation, disruption of sewage systems, makeshift housing, hazards attending industrial use of certain toxic chemicals and radioactive substances —all are familiar to public health sanitarians. While the magnitude of such problems in a major disaster would be many times that of any previously experienced here, the basic training and experience, the fundamental know-how for handling emergencies and the teamwork which is required are utilized every day.

Long-standing cooperation exists between public health personnel and other agencies, businesses and private industry throughout the city. In times of emergency conditions in water supplies, such as the example given above, chlorinating equipment from other city departments and industrial manufacturers is but a telephone call away. Sufficient portable equipment is available to chlorinate the entire city water supply over an indefinite period.

Milk

An active civil defense self-help committee, organized by the health department and composed of members of the dairy industry, has amassed a large amount of information and established procedures for the disaster conversion of methods and facilities. One hundred steel-lined tank trucks and 20,000 ten-gallon milk cans could be immediately channeled into the transportation of milk, water or other liquid foods if needed. Permanent and standby dairy equipment for power, refrigeration, storage and transportation has been inventoried and plans made for the pasteurization and distribution of milk despite damage or destruction of many facilities. Daily inspection of the plants of all large dairy producers and frequent tests of milk are already established patterns both in the city and in other California counties supplying milk to Los Angeles. A branch milk laboratory, maintained in the San Joaquin Valley, could supply a valuable disaster service, assuming that this location would be a safe distance from the immediate area of destruction.

Radiological Monitoring

With more and more industries using ever greater quantities of radioactive materials in normal peacetime pursuits, skilled radiological monitoring for the protection of workers against harmful ionizing effects from gamma and x-radiation as well as from beta and alpha emitters has become an accepted and established service provided by the health department in Los Angeles. A fully equipped central laboratory and a mobile radiation detection laboratory (loaned to the health department by the State Office of Civil Defense) are engaged in complete radiological assay. A number of sanitarians in the health department and many civilians scattered throughout the city have been trained in radiological monitoring. Following thermonuclear explosions, these radiologic teams would be deployed principally for the monitoring of food and water (public supplies, private wells, bottled water, etc.), although, where needed, they would be equipped to do atmospheric and ground surface radiation detection as well.

Radiological monitoring personnel from the department have participated in hydrogen bomb tests in Nevada.

Food Supplies

All local supplies of food, in addition to being checked for radiation exposure and radioactive particulate contamination, would require examination by experts for damage resulting from water, sewage, flash heat and fire, falling debris, glass splinters and explosion shock. Radiological monitoring and examination by experienced inspectors are sufficient for immediate separation of unsafe and possibly contaminated food from usable supplies, pending use of more precise laboratory procedures which might later be available.

Sanitarians from the food inspection service would be assigned to supervise food storage, preparation, handling and dish washing in mass feeding centers to reduce the possibilities of food poisoning or the transmission of disease.

Vector Control

The threat of large infestation of rats and insects in a major disaster is a relatively minor one, except in instances of the introduction of diseases which are transmitted by rodents or insect vectors. Traditionally, the best defense against either is the destruction of adult vectors and the elimination of harborage and breeding places. Currently, Los Angeles has fewer rats than most large cities in the country. Regular inspection and a full-time pest control division of the health department maintain this standard. Daytime activities of this division are supplemented by night rat control work, patrolling public areas where rat harborage may occur, poisoning, trapping, inspecting. Five years ago some 8,000 rats a month were tested in the departmental laboratory to detect disease organisms. Today this procedure is not deemed necessary as a routine but is done only in special instances.

Insects, too, as a menace to the public health are being effectively controlled. In the event of disaster, barring bacteriological attack, any intensive efforts to combat an inevitably increased rodent and insect population would be postponed until personnel could be spared from more urgent disaster relief activities in the field. If outbreaks of rodent and insect-borne diseases should occur, high priority would be given to the extermination of these carriers. The availability of local supplies of rodenticides and insecticides through wholesale suppliers has been ascertained and would be sufficient for temporary emergency use.

Following disasters, overcrowding of refugees and inadequate bathing and laundry facilities create problems of human pest control. Public health sanitarians, skilled in the safe and effective use of insecticides, would assist in controlling body lice, bedbugs, fleas, mites and ticks through disinfestation of people, their clothing, bedding and personal belongings as well as of the camp environment, equipment and materials. They would also supervise the establishment of bathing and laundry facilities and disposal of garbage, refuse and human waste.

Industrial Hazards

Increasingly the health department receives requests for detailed technical studies of suspected health hazards in various working environments. Special collecting and analyzing devices and equipment are used for studies of gas, fumes and dust.

Working closely with industrial management and labor unions, the occupational health team encourages accident prevention programs aimed at individual and collective safety. The staff serves in an advisory capacity to industry to help prevent possible explosions or other preventable accidents which might result in the release of toxic materials, chemicals and gases, and to protect personnel from hazardous substances where normal protective measures are inadequate or inoperative. Encouragement is given to the development of in-plant emergency procedures for the protection and evacuation of workers, and to special educational programs for employees, including first aid training and instruction on nutrition. As a result, a small but increasing corps of first aid trainees in industry has been formed to provide the vanguard of disaster relief among industrial workers in any type of catastrophe.

Emergency Feeding

That "an army fights on its stomach" was a recognized fact of warfare long before Napoleon expressed it in just that way. That a besieged civilian population lives or dies on its stomach is equally true.

To a people whose abundance has given them little acquaintance with starvation, lack of food is normally an academic consideration. Yet assuring a ready supply of safe nutritious food in areas of destruction is one of the largest problems to be met in disaster preparation. Three major factors involved in assuring food supplies are: Procurement and distribution; protection against contamination; and provision and maintenance of an acceptable diet which meets essential nutritional needs under emergency conditions. The first of these is not a function of public health; the second has been discussed above.

Mass feeding of victims of natural disasters in the United States is by definition and precedent a

function of the American National Red Cross. This organization has been integrated into the civil defense plan in order that its valuable experience in caring for displaced persons be available when needed regardless of the source of disaster.

Functionally, the health department has a supportive duty in this endeavor. In Los Angeles, the nutrition staff of the health department has been active in disaster planning and would take its place to assist in the supervision of mass feeding during any emergency. Civil defense nutrition services recommend types and amounts of food which should be available for emergency feeding of the general population and of such special groups as infants, children, pregnant women, the aged and certain categories of those requiring special diets.

Depending upon the length of the emergency, attention would be given increasingly to special diets—such as those for diabetics, peptic ulcer patients, etc.—which were not required during the immediate postdisaster period. A continuing analysis of the effects of emergency feeding on the population would be necessary.

The stamina with which subjected people would be able to meet the devastation of an atomic attack, would depend largely upon their physical and mental health. As in all other public health programs, the nutrition service aims at the improvement of general health and to prepare individuals for physically coping with stress. To this end, it conducts a year-round campaign, utilizing every available medium, promoting good eating habits, debunking food fads, counteracting dietary misinformation and stimulating safe weight reduction and weight gain practices. Specifically for disaster it has propounded the stocking by families of an adequate three-day emergency food ration—a detailed listing prepared by departmental staff and in use throughout the United States.

Laboratories

The functions of a public health laboratory are probably the least well defined of any of the public health responsibilities during a period of disaster. This lack of definition is further complicated in Los Angeles by the centralization of laboratory facilities in one of the chief targets of the city—Civic Center.

Ordinarily, the load of the public health laboratory consists of bacteriological, serological and virus tests for communicable diseases; milk testing; Rh factor determinations for maternity clinic patients; and special examinations and tests for possible food poisoning, rabies, etc.

Meeting the immediate emergency needs of the acutely ill and injured would take precedence over all other laboratory activity in a disaster. Utilization of all staff and facilities for blood typing, blood counts and hemoglobins would probably be a requirement of the public health laboratory as well as of all undamaged clinical laboratories in peripheral areas.

The type of disaster, areas affected, extent of damage to facilities would all be factors in determining which other procedures should or could be continued in the early days postdisaster. For example, preparation and maintenance of supplies of blood, blood derivatives and reagents would be a major function of the laboratory if facilities remained intact. Sterilization and packaging of instruments is a routine which can be quickly and efficiently performed in the public health laboratory, as demonstrated in the mass poliomyelitis vaccination program. Sample testing of milk, water and food—a daily experience in the laboratory—could be conducted on a large scale if circumstances dictated a more imperative need for these services than for clinical tests.

Laboratory personnel would be a ready source of administrative ability in the establishment of field laboratories to aid improvised hospitals and emergency first aid stations.

In essence, the role of a public health laboratory in times of disaster is versatility—personnel, equipment, experience and established procedures for large-scale laboratory operations — which would meet general or specialized needs as they arose.

Public Health Nursing

Perhaps more than any other health worker, the public health nurse is a proponent of self-help. Her effectiveness in helping to control communicable diseases, reduce the maternal and infant death rates, promote good child health—all depend upon her aptitude in using the techniques of effective salesmanship. This salesmanship she must employ at all times on her job, with individuals at home, in clinics and in groups, and it must lead to their acceptance of health principles and methods in their own interest.

Because of her adaptability in meeting emergency situations as they arise, and because of the variety of tasks she performs, the public health nurse is an essential element in a disaster organization.

Every available hospital, emergency station and improvised medical facility and all available doctors and clinical nurses would, in a major disaster, be confronted with the enormous job of caring for acutely ill and wounded attack victims. These casualties would be added to the thousands of sick and injured who are hospitalized or under home medical care normally. Public health nurses would be called upon to assume much of the direction of home care of the sick.

Because public health nurses in any community comprise a very small group in relation to the population (only 113 in the Los Angeles City Health Department) they would be forced to administer a home care program manned by partially trained or untrained volunteers. Under emergency conditions with a shortage of medical personnel, some public health nurses would have to enter the field of diagnosis and treatment in order to save lives and prevent serious illness. Other duties within the realm of public health disaster nursing would include: Assistance in the detection and control of acute communicable disease in emergency shelters and in the resident community; assisting with nursing supervision of children and aged persons who have been evacuated from their homes; providing nursing services to pregnant women, mothers and infants in homes and shelters; providing "psychological first aid" to help in preventing mass panic and modifying traumatic emotional shock.

All public health nurses in the Los Angeles City Health Department take refresher training in blood drawing and all take a standard first aid course. All are experienced in mass immunization programs, all are proficient in handling large groups of people for health purposes, all know how to set up large clinics quickly.

As in the case of laboratory personnel, public health nursing strength lies in its versatility and flexibility. These important abilities are at the nurse's command only because her daily duties demand them. This is perhaps the most valuable training of all for disaster preparedness.

Organizing for Civil Defense

In addition to their public health responsibilities during disaster, health departments have been delegated specific obligations in the official civilian defense organization, which should be noted.

Under the authority of the state Civil Defense Act of 1950 and the Los Angeles City Civil Defense and Major Disaster ordinance, the city health officer is legally responsible for the development, organization and operation of a Health Services Division to meet emergency needs in time of major disaster whether a result of natural catastrophe or enemy attack. To this end, the city has been divided into 35 districts, each of which has a volunteer medical director appointed upon the recommendation of the Civil Defense Committee of the Los Angeles County Medical Association. Each of these districts is a self-contained unit operating within the structure established by the Health Services Division, each with a full complement of volunteer personnel recruited by district medical directors, including executive, intelligence, operations, personnel, supply, transportation, communications, liaison and public relations officers. District medical directors are charged with providing such organization as may be required to meet immediate local medical needs in the event of a disaster. Coordination of the districts and integration with the various other divisions of the civil defense organization is the duty of the Health Services Division headquarters staff.

All health department personnel are enrolled in the civil defense organization, as are all city employees, and all have instructions to report immediately to their nearest district health center for special assignment in the event of disaster. All of the nine district health offices are linked to the central office through short wave radios manned by trained operators who test equipment daily. The health officer is provided with short wave receiving and transmitting apparatus in his automobile for immediate contact with health districts and the civil defense headquarters. A staff trained in techniques of rapid and effective mass communication is prepared to transfer from routine health education duties to disaster communication and information services.

For five years, the concept of civil defense has been affected by the ebb and flow of the collective public emotion in response to international events. No sustained peak of fervor has existed in the minds of the people for self defense against a devastation too awful to comprehend—nor would it be psychologically healthful for them to maintain a high degree of fearful anticipation. Despite this, preparations against known dangers can and are being made. Meanwhile, private physicians and public health agencies alike have an important stake in building the strength of the nation through its principal resource—its people. Herein lies our future, in war or peace.

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Civil Defense

Medical Aspects from the Federal Standpoint

JOHN M. WHITNEY, *M.D.*, Battle Creek, Michigan

THE FEDERAL Civil Defense Administration (FCDA) was established by Congress in December, 1950, under Public Law 920 of the 81st Congress. It is an agency of the Executive Branch of the Federal Government, reporting directly to the President. It was formed from a nucleus which had been working during the two preceding years in the National Security Resources Board (NSRB), consisting of the Health Resources Office and the Civil Defense Office.

Preceding the NSRB activities were two rather intensive studies done within the Department of Defense, resulting in the so-called Hopley Report, "Civil Defense for National Security."

All of these earlier studies indicated that, with modern weapons and modern means of delivery, Civil Defense was a vital necessity for this country.

So while the official organization (FCDA) is now more than four years old, organized activities have been going on for over six years.

The Civil Defense Act

Civil Defense is defined in Public Law 920 to mean all those activities and measures designed or undertaken (1) to minimize the effects upon the civilian population caused, or which would be caused, by an attack upon the United States, (2) to deal with the immediate emergency conditions which would be created by any such attack, and (3) to effectuate emergency repairs to, or the emergency restoration of, vital utilities and facilities destroyed or damaged by any such attack.

The law further defines Civil Defense so as to include, but not be limited to, (1) measures to be taken in preparation for anticipated attack, (2) measures to be taken during attack, and (3) measures to be taken following attack.

1. Pre-attack measures:
   - (a) Establishment of appropriate organizations, operational plans, and supporting agreements.
   - (b) Recruitment and training of personnel.
   - (c) Conduct of research.
   - (d) Procurement and stockpiling of necessary materials and supplies.
   - (e) Provision of suitable warning systems.
   - (f) Construction or preparation of shelters, shelter areas, and control centers.
   - (g) When appropriate, the nonmilitary evacuation of civil population.
   - (h) Education and training of the public in techniques of survival.
2. Measures to be taken during attack:
   - (a) Emergency information and instructions to the public.
   - (b) Enforcement of passive defense regulations prescribed by duly established military or civil authorities.
   - (c) Evacuation of personnel to shelter areas.
   - (d) Control of traffic and panic.
   - (e) Control and use of lighting and civil communications.
3. Post-attack measures:
   - (a) Fire-fighting and rescue.
   - (b) Emergency medical, health, and sanitation services.
   - (c) Monitoring for specific hazards of special weapons.
   - (d) Unexploded bomb reconnaissance.
   - (e) Essential debris clearance.
   - (f) Emergency welfare services.
   - (g) Immediately essential emergency repair or restoration of damaged vital facilities.
   - (h) Restoration of public confidence and morale.

The word "immediately" should be noted in the Act, because it was clearly the intent of Congress that Civil Defense activities be confined strictly to the emergency period. What is further needed is a clear-cut definition of what would constitute the emergency period.

Civil Defense Responsibilities

In this era, when civilians as well as military forces are actively involved in war, constant readiness for defense of civilians against enemy attack is essential. Civil Defense in the United States must be an efficient organization which can be mobilized instantaneously to combat the effects of enemy at-

Director, Health Office, Federal Civil Defense Administration; Medical Director, U. S. Public Health Service.

tack on civilians. Moreover, it must be kept in a state of constant readiness so long as there is any threat of war in the foreseeable future. Finally, Civil Defense must be made a living function of civilian life, a matter of custom and habit, a matter of maximum activity, by utilizing existing patterns, existing agencies and existing means.

The basic operating responsibility for civil defense is in the individual and his local government. The individual, given all training possible, does what he can for himself in an emergency. The family unit, similarly trained, attacks its own problems while also contributing to the organized community effort. The community's civil defense organization works to meet its own crisis, receiving outside help if its facilities are inadequate, or contributing support to neighboring communities under organized state direction.

The preparation of the individual or the family for wartime attack on civilians, and their protection and preservation before and after enemy attack, is the prime objective of Civil Defense. Such individual and family protection is indispensable to the maintenance of civilian morale and determination to see a devastating war through to a victorious conclusion, and to the maintenance of civilian production of war materials, without which military efforts would quickly collapse.

The Congress—after studying various suggestions of placing Civil Defense in the Department of Defense, or as an independent agency, or spreading it throughout the government—decided that the primary operating responsibility would be in the states and their political subdivisions. The newly-constituted federal agency (FCDA) would coordinate the activities of the states and provide guidance and support—technical, financial and other.

The functions and duties of FCDA are: (1) To prepare national plans and programs for Civil Defense, and to advise the President, Congress, and the states of the status of Civil Defense; (2) to disseminate adequate civil defense information; (3) to provide courses and facilities for schooling and training; (4) to provide communications, warnings, and evacuation plans, (5) to develop civil defense measures, equipment, and facilities for the protection of the population; (6) to provide coordination of interstate programs and operations; (7) to advise the states on establishment of stockpiles of medical and other supplies; (8) to make financial contributions to the states for civil defense purposes; (9) to delegate certain responsibilities to other federal agencies and to coordinate their activities; (10) to coordinate civil defense activities with neighboring countries and allies; and (11) to stockpile equipment and supplies to be furnished the states and cities when needed.

Disaster Relief

In addition, FCDA, under executive order, has been directed to coordinate all federal activities in major disasters. Under Public Law 875 provision is made for the federal government to assist local and state governments in alleviating suffering and damage from major (natural) disasters, to repair essential public facilities and to foster necessary state and local organizations and plans.

Medical Program

Within the framework given above the Health Office of the Federal Civil Defense Administration has the responsibility in the medical and health areas of Civil Defense. These areas include:

1. Casualty Care
2. Medical Care of Noncasualties
3. Sanitation
4. Radiological Defense
5. Biological Warfare Defense
6. Chemical Warfare Defense
7. Mortuary Services
8. Medical Stockpiling

The FCDA Health Office exercises its responsibilities and functions under the Assistant Administrator for the Technical Advisory Services. In addition to the national office staff, there is a medical officer in each of the seven FCDA regional offices. His function is to work with the states and cities and the professional medical, health and allied groups within his region.

Planning Bases

Under current planning FCDA assumes that any or all of the 70 critical target areas could be attacked with nuclear and other methods of warfare. This assumption results in a total casualty estimate of 13.5 million living and dead immediately after attack. Of these, it is estimated that 8.2 million could survive the first day, constituting the extent of the total casualty treatment load. Eventual survivors would number about 5.5 million, making a casualty load of about 5 million over a three-week period.

These casualty estimates may be revised up or down as future developments warrant. Obviously, with sufficient warning time to effect evacuation the casualties would be reduced. On the other hand development of larger weapons with faster means of delivery might cause an upward revision of estimates.

Further, the effect of evacuation on the total medical load must be considered. While successful evacuation may reduce casualties, the public health and medical care problems of large numbers of dis

placed persons, deprived of the usual protective community resources, will be greatly increased. However, the load upon the medical and health resources will probably be just as great.

1. *Casualty Care.* This continues to be the gravest problem in Civil Defense because of its magnitude. In all the United States wars from the Revolutionary through World War II there was a total of 1,160,552 casualties that survived wounds. Civil Defense is currently planning to take care of 5,000,000 surviving casualties, produced within a short space of time—actually hundreds of thousands within a matter of seconds. Immediate casualty services would have to be provided locally, in great part by nonprofessional personnel under extremely adverse conditions. Initial supplies and equipment must come from local and close-by sources until state and federal aid can arrive. Obviously, effective casualty services will require the best advance planning, organizing and training. It is equally apparent that there will not be enough physicians and nurses and other professional and technical personnel to provide anything more than the most dilute emergency life-saving care. The principle of "doing the best for the most" will have to apply. Professional manpower and man-hours will have to be conserved for the important function of the use of professional judgment in determining which lives can be saved with available facilities. We will not be able to afford the waste of time and valuable supplies on casualties who cannot be saved except by time-consuming procedures. Ordinary peace-time handling of the injured cannot be practiced at a time like this. A good example would be a perforating wound of the abdomen. Good surgical technique ordinarily saves a large majority of persons with such wounds. But time and personnel will not be available to open the abdomen and spend several hours in exploration and repair. Expectant and delayed treatment in such cases is the only answer.

We are beginning to instill this philosophy in our medical schools. One of our big problems is to get training for mass casualty care down to the local physician. FCDA is exploring the possibility of putting a series of short lectures on sound film or film strips with platters. Content of the film would be similar to that given at the Walter Reed Army Medical Center Course entitled "Management of Mass Casualties." Such a series would contain guidelines for the classification (sorting) of casualties as well as the management.

2. *Medical Care of Noncasualties.* In addition to the care of those injured by enemy attack, we must plan to provide emergency medical care for all of the remaining population who will need medical attention. With great numbers of people on the move the average day-to-day morbidity will no doubt be increased. Every able-bodied person will be working to the point of physical and mental exhaustion. Food, rest, and transportation will be in short supply.

With evacuation of large numbers of the population will come the additional hazard of increased incidence of the communicable diseases. The chronic disease groups will be deprived of their usual attention in homes and outpatient dispensaries. Babies will continue to be born—probably more and earlier, if previous war-time experience is any indication. Abortions and miscarriages will increase. Injuries from accidents, traffic and other kinds, will be many. If the weather is unfavorable morbidity will be increased by exposure.

3. *Sanitation.* This program is directly connected with the control of the communicable diseases referred to above. Cities depend for their existence on a supply of safe water and food, on effective removal of liquid and solid wastes, and on shelter provided with plumbing, electricity, gas and heat. Disruption of utilities and the destruction of shelter could lead to extensive public health problems. If a city is evacuated, the population, normally accustomed to high sanitation standards, will be susceptible to a wide variety of communicable diseases when exposed to the primitive living conditions which must be expected in disaster situations. The threat of major epidemics in the evacuated and support area populations will be great. The chief specific problems will be:

(a) Delivery of uncontaminated drinking water to meet minimum subsistence standards.

(b) Disposal of excreta and liquid wastes to prevent enteric infections.

(c) Provision for emergency pasteurization or boiling of milk.

(d) Emergency housing sanitation to control the spread of respiratory infection and other communicable diseases.

(e) Insect and rodent control in areas where specific human diseases may be endemic in the insect and wild rodent populations.

(f) Food protection, including storage and handling, waste disposal, and other sanitation measures at mass care, hospital and emergency feeding centers.

(g) Decontamination of personnel and inanimate objects.

(h) Protection of shelter air intakes from the introduction of contaminants resulting from special weapons attack or from radioactivity.

(i) Determination of the safety of surface sources of water supply and uncovered parts of distribution systems, such as reservoirs.

(j) Determination of the safety of stored foods and foodstuffs.

(k) Provision for adequate potable water and safe food, and for emergency handling of wastes, in shelters.

The number of trained or experienced sanitation personnel on the peacetime staffs of local and state health departments will be inadequate. Support plans should provide for the interchange of technical personnel. Volunteer or part-time workers should be recruited and trained in advance. Many commercial establishments in the food-preparation and service industries have personnel with sanitation experience. Pest control, septic tank cleaning, building and maintenance firms also have personnel useful for sanitation, as well as equipment and supplies.

4. *Radiological Defense.* With the release of the Strauss fall-out announcement to the public, radiological defense assumed a new importance. The radiation hazard is nothing new nor are we without defense against it. The possibility of increased hazards from radiological contamination emphasizes the following points:

(a) The need for more detailed weather data. The Weather Bureau is ready and willing to cooperate closely at all levels of operation.

(b) The need for considering radiological contamination as an additional factor in plans for evacuation.

(c) The desirability of providing cover or shelter, since almost any kind of cover or shelter can reduce the danger appreciably. An ordinary frame house outside the area of blast and fire, for example, will afford some protection. A basement shelter will provide even more. A simple underground shelter with three feet of earth cover will give virtually complete protection from lethal radiation.

(d) The need for additional development in monitoring methods, including aerial and fixed station procedures.

(e) Implementation of training programs to keep step with the increasing number of survey instruments being procured.

FCDA continues to get out informational material on fall-out and shelter. A stepped-up training program is being developed in cooperation with the Department of Health, Education, and Welfare. The 1956 appropriation to FCDA includes funds for research in monitoring methods, decontamination, shelter, and medical management of radiation injuries. Also included are some $4,000,000 for procurement of survey instruments and dosimeters for the federal stockpile. Instruments will continue to be available to the states and cities for training purposes.

5. *Biological Warfare Defense.* The program for defense against biological warfare is divided into defense of man, defense of animals, and defense of crops. Adequate basis for the defense of man is found in the private medical practice and health departments of all the states. However, auxiliary health personnel is needed to supplement the peacetime communicable disease services within the community. For example, the need for water, milk and food sampling in times of threatened use of biological warfare will tax the community far beyond its peacetime requirements. Auxiliary personnel must be available to assume this additional load. This appears to be a logical spot for science students and teachers to fit into the civil defense picture in their community. On the national level, FCDA has delegated the responsibility for planning, research, and development of biological warfare defense and communicable disease control to the Department of Health, Education, and Welfare and the Department of Agriculture. Conferences at a technical level are in progress with the Public Health Service to formulate a working agreement delineating respective spheres of activity and responsibility in biological warfare defense and communicable disease control. Similar negotiations have been undertaken with the Food and Drug Administration of Department of Health, Education, and Welfare to coordinate their activities with FCDA.

The following research and training projects relating to communicable disease control and biological warfare defense, have been initiated by the Public Health Service:

(a) Immunization investigations on basic questions leading to improvement of vaccines and other immunizing procedures.

(b) Detection, prevention and control of airborne diseases.

(c) Laboratory techniques for rapid identification of biological warfare agents.

(d) Water supply protection.

(e) Milk and food protection.

FCDA stockpiling of biologicals and chemotherapeutic agents now is based in part on the requirements for a biological warfare defense and communicable disease control. A joint FCDA-PHS Technical Committee to advise in this area has been established.

The APHA Manual "Control of Communicable Disease" has just been reissued. Twelve thousand copies with an FCDA cover for distribution to state and local civil defense and health agencies have been ordered.

FCDA film strips and a filmograph on various aspects of the defense against biological warfare are almost complete. These are nontechnical and di-

rected at lay groups. Exhibits on biological warfare and sound films on animal diseases have been cooperatively developed and acquired by FCDA and the Department of Agriculture.

6. *Chemical Warfare Defense.* Certain fields of responsibility in chemical warfare have been delegated to the Department of Health, Education, and Welfare. We feel that the whole Civil Defense Chemical Warfare program is included in detection and identification, individual protection, medical care, training, and industrial hazards.

The Army Chemical Corps is developing, for the Navy, a kit for the detection of nerve gases and vesicants which promises to be suitable for civil defense purposes.

The protective mask for civil defense workers has been standardized and is now available.

The Civilian Protective Mask (E-52), developed by the Chemical Corps for FCDA, should give sufficient protection against all agents, including protection against inhalation or ingestion of fall-out particles, to permit evacuation or transportation to shelters. It has passed engineering tests and we plan to procure 5,000 in five sizes (1,000 of each size) for field testing on approximately 1,000 civilian families. It is anticipated that field testing of this mask will begin soon, and the mask should be ready for procurement at a cost of $2.00 to $2.50 each. The question of their distribution is under study.

A protector for infants and children up to 6 years of age is also under development.

Atropine self-injection units for treatment of nerve gas casualties are still being procured under the federal stockpiling program. They will also eventually be supplied with all types of protective masks.

Training in this area presents the same problems as in other fields. Plans are being developed by the Public Health Service to implement training programs for the states.

It is planned that the American Chemical Society be asked to assist in a study of the chemical plants in target areas which might become a hazard by release of toxic chemicals. This study would be coordinated with the Industry Office of FCDA. When the problem is better understood, the Public Health Service will be asked to recommend the necessary precautionary measures.

7. *Mortuary Services.* While mortuary service is recognized as an essential, priority has been accorded other programs in the past. However, FCDA has developed a manual on mortuary services which is scheduled for issuance shortly. This manual will contain detailed recommendations for the collection, identification, and disposal of the large number of dead to be expected under enemy attack.

8. *Medical Stockpile.* From the federal standpoint more progress has been made in this program than any other. FCDA now has stored under 24-hour guard in some twenty warehouses scattered throughout the nation enough medical and surgical supplies and equipment to care for 2,500,000 casualties for a period of three weeks. With the funds provided in the 1956 fiscal year this amount will be increased to enough for 3,500,000 casualties for three weeks. This program is well in balance in all categories except for the 200-bed improvised hospitals. We have been able to order only 930 of the 6,000 improvised hospitals it is estimated would be needed. The states have procured about 68 of these units.

Our stockpile requirements must, of course, be revised as future developments warrant. At present, FCDA is working toward the goal of requirements for 5,000,000 surviving casualties for three weeks. By the end of fiscal year 1956 (June 30) we will have reached 70 per cent of this goal.

Although some states continue to procure items for medical stockpile, the amount has significantly decreased in the past year. Until authority and funds are provided the federal government, our stockpiles must still be considered as replenishment supplies for the states and the cities; initial requirements must come from state and city sources until federal supplies can arrive.

There is a noticeable trend towards the federal government's assuming more financial responsibility and more direct authority in the nation's civil defense efforts. However this turns out, though, it should be borne in mind that, if attack comes, it is the worker who is on the scene who must do the job. No federal agency has the manpower to perform so enormous a task. It must be a sharing of responsibility and duties. The federal government should do everything possible to assist the states and cities in preparing for something it is hoped will never happen. Yet every sound-thinking person recognizes that we must be prepared. Upon the shoulders of the medical profession will fall the most gigantic task ever created. Sound planning can make it easier.

622 W. Michigan Avenue, Battle Creek, Michigan.

California MEDICINE

For information on preparation of manuscript, see advertising page 2

EDITORIAL

Civil Defense—Your Responsibility

THE SEEMING ABATEMENT in international tensions initiated by the top-level meetings in Geneva and abetted by our inherent desires for peace have contributed to a sense of security whose foundation is far from secure. Even our President and his Secretary of State recently have warned the nation lest we exchange the cold facts of demonstrated communistic plans of aggression for the warmth of wishful thinking.

Unfortunately, the tides of Civil Defense rise and fall with the popular concern over the dangers of enemy attack. The Kremlin must take great satisfaction in the present low ebb of Civil Defense interest on the part of the American populace. Our nation cannot afford again to be unprepared if and when the enemy strikes. Lest some may read these lines with the cynic's jaundiced eye, let him think back only a little more than a decade, when proud ships of our navy were sunk at anchor and the infantry shouldered broomsticks and the artillery maneuvered stove pipes. The gravity of a future attack lies in the fact that those who will suffer from the lack of preparedness are not only the military but, even more, the civilian American men, women and children within as well as without the continental limits of the United States.

American physicians traditionally have played an active role in the defense of our nation. In fact, seldom in the annals of history has a profession rallied as did ours during World War II when one-third of the total strength of our profession volunteered and served with the armed forces. Again our nation faces a real crisis. We are living in the time of the so-called cold war—a kind of warfare made all the more dangerous by virtue of the psychological combat of nerves wherein the winner subtly succeeds in wearing down an opponent to a status of indifference. No factor will destroy Civil Defense effort faster and more thoroughly than popular indifference.

Nothing in our history has prepared our nation for the ruthlessness of atomic warfare carried out on our own home soil. Future warfare will not differentiate between the military and civilian population, for to destroy the source of the bomber or aircraft carrier is far more effective than to destroy the finished product on the field of combat. The enemy will attempt to liquidate population centers in the hope that the psychological impact of devastation will break the morale of the American people.

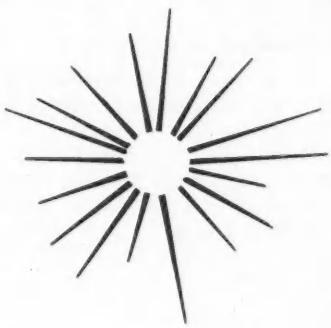
In the final analysis a major factor in the survival of our nation will be the ability of American physicians to cope with the problems of mass casualties. No physician, however inadequate he or she may feel professionally, or regardless of the distance removed from target priority potentials, can absolve himself or herself of the responsibilities of Civil Defense preparedness. In the light of the destructive nature of total war it becomes increasingly apparent that much of the medical support for human salvage in the event of national disaster must come from the satellite communities. Thus, every physician—specialist or general practitioner—whether from a rural area or metropolitan center, will have a direct medical responsibility in the care of casualties.

Communities will look to their physicians for leadership in certain phases of Civil Defense and unless this leadership is forthcoming and intelligent, we will have failed miserably in our responsibility to our community and our nation alike. In order to discharge this obligation effectively, the American doctor should study the rudimentary fundamentals of mass casualty care; the value of accurate triage; the problems of rapid and distant patient evacuation; the basic therapeutic considerations in the handling of large numbers of severely burned casualties; the logistics of whole blood, plasma and plasma expanders as related to a national emer-

gency; the prevention and treatment of radiation injury and many other problems associated with Civil Defense.

Fatalism, a grossly inaccurate attitude, has no place in the scientific repertory of the American doctor. Just as dangerous is the philosophy that medical preparedness can be forged in the fire of enemy attack, for under the new terms of war the initial blow may well be the most critical. The only acceptable course remaining for American medicine is to prepare realistically for a possible national catastrophe with the sincere prayer and fervent hope that the results of this preparation will never culminate in disaster application.

So swift, nowadays, is the pace of invention of new ways of destruction that no program of Civil Defense can remain static. This issue of CALIFORNIA MEDICINE is given over to medical aspects of Civil Defense in order that the latest developments can be reported and physicians can bring themselves up to date on the problems they will face and the duties that will be theirs should our country be attacked. This special edition was brought into being by Dr. W. Dalton Davis, who is medical consultant of the Medical and Health Services Division of the California Office of Civil Defense, and by Dr. Justin J. Stein, chairman of the Committee on Military Affairs and Civil Defense of the California Medical Association. They and the other physicians who have written informative articles for this issue deserve our thanks for this service to their colleagues and their country.



WITH WARNING

IMMEDIATELY REPORT TO YOUR CIVIL DEFENSE ASSIGNMENT

IF THIS IS NOT POSSIBLE, REPORT TO THE NEAREST MEDICAL INSTALLATION

WITHOUT WARNING

TAKE IMMEDIATELY AVAILABLE COVER. DO NOT LOOK AT THE BRILLIANT FLASH. IF IN CAR AND NO SHELTER AVAILABLE, STOP AT CURB, CLOSE ALL WINDOWS, TURN CAR RADIO ON, LIE ON FLOOR OF CAR.

AS SOON AS POSSIBLE CARRY OUT CIVIL DEFENSE ASSIGNMENT.

M. D.

WHAT TO DO?

KNOW YOUR C.D. ASSIGNMENT. LEARN ALL ABOUT C.D.

California MEDICAL ASSOCIATION

NOTICES & REPORTS

Council Meeting Minutes

Tentative Draft: Minutes of the 414th Meeting of the Council, Ambassador Hotel, Los Angeles, August 28, 1955.

The meeting was called to order by Chairman Lum in the Regency Room of the Ambassador Hotel, Los Angeles, at 10:00 a.m., Sunday, August 28, 1955.

Roll Call:

Present were President Shipman, President-elect Charnock, Speaker Doyle, Vice-Speaker Foster, Secretary Daniels and Councilors Lum, Heron, West, Wheeler, Loos, Wadsworth, Pearman, McPharlin, Bostick, Teall, Kirchner, Varden, Carey and Rosenow.

A quorum present and acting.

Absent for cause, Editor Wilbur and Councilors Sherman and Reynolds.

Present by invitation were Messrs. Hunton, Clancy, Thomas and Gillette of C.M.A. staff, legal counsel Hassard, Doctors Francis Hodges and William Gardenier of California Physicians' Service, Doctors Dan O. Kilroy, Joseph F. Sadusk, Jr., and Malcolm Merrill, Messrs. Ben H. Read and Eugene Salisbury of the Public Health League of California and county society executive secretaries or employees William Scheuber of Alameda-Contra Costa, Jerry L. Pettis of Los Angeles, Robert Marvin of Riverside, George W. Foster of Sacramento, Olive Neick of San Francisco, Boyd Thompson of San Joaquin, Joseph Donovan of Santa Clara and Thomas DeVere of Stanislaus.

1. *Minutes for Approval:*

(a) On motion duly made and seconded, minutes of the 412th meeting of the Council, held April 30-May 4, 1955, were approved.

(b) On motion duly made and seconded, minutes of the 413th meeting of the Council, held May 4, 1955, were approved.

(c) On motion duly made and seconded, minutes of the 250th meeting of the Executive Committee, held May 4, 1955, were approved.

(d) On motion duly made and seconded, minutes of the 251st meeting of the Executive Committee, held July 20, 1955, were approved.

2. *Membership:*

(a) A report of membership as of August 25, 1955, was received and ordered filed.

(b) On motion duly made and seconded, 69 members whose 1955 dues had been received since July 20, 1955, were voted reinstatement.

(c) On motion duly made and seconded, Doctor Cyril T. Callister of Alameda-Contra Costa was elected to Associate Membership.

(d) On motion duly made and seconded, three applicants were granted reductions of dues because of illness.

3. *Financial:*

A report of bank balances and supplementary information as of August 25, 1955, was received and ordered filed.

4. *Medical Review and Advisory Board:*

Doctor Joseph F. Sadusk, Jr., chairman of the Medical Review Advisory Board, presented a progress report from his committee, including a set of suggested principles to apply in the underwriting

of professional liability insurance. After discussion and following several questions, on motion duly made and seconded, it was voted to approve this report.

5. *Los Angeles Medical Convention:*

Doctor Paul A. Foster discussed the Los Angeles Medical Convention, which is scheduled for January 3 to 5, 1955. He pointed out that the medical and public aspects of this meeting had been separated and the public portions of the meeting scheduled for a more extended period following the three-day medical convention. Exhibits are to be screened through a review committee and a committee on arrangements. In response to a question, Doctor Foster stated that the scientific portion of the program was probably being scheduled as a one-time meeting only, not an annual event.

On motion duly made and seconded, it was voted to extend to the Los Angeles County Medical Association the best wishes of the Council for a successful meeting.

6. *Professional Disability Insurance:*

Doctor Arthur A. Kirchner, chairman of the committee on Accident and Health Insurance, reported that difficulties which had arisen in the handling of claims for members suffering disabilities would apparently be eliminated in the establishment on September 1 of a claims office in Los Angeles to handle the California program. The underwriting insurance carrier has paid out more than $600,000 in claims, he said, and is now planning a third type of contract, under which the physician may elect a six-months waiting period before the payment of benefits and secure coverage at an annual premium of $138. On motion duly made and seconded, it was voted to approve the use of the Association letterhead for a letter to announce this new coverage. The letter would be signed by the members of the committee.

7. *State Department of Public Health:*

(a) Doctor Malcolm Merrill, State Director of Public Health, outlined the program drawn up by his department, in conjunction with a medical advisory board, for the distribution of poliomyelitis vaccine. While the vaccine is still in short supply, and while federal funds will be available for the purchase of certain quantities, a portion of the supply available to this state will be purchased by public agencies and the balance allowed to enter normal commercial channels. A system of reporting vaccine used, both by individual cases and in the form of a weekly report, has been developed and physicians will be asked to follow the uniform reporting procedure.

Doctor Edward B. Shaw, chairman of the medical advisory board, and Doctor Francis E. West, chairman of the Association's Commission on Public Health and Public Agencies, also urged that the program developed by the State Department of Public Health be approved and that the Association encourage its members to cooperate in the vaccine distribution and reporting program.

On motion duly made and seconded, it was voted to approve the plan of vaccine distribution outlined by Doctor Merrill.

On motion duly made and seconded, it was voted to encourage members of the Association to cooperate in the distribution and reporting program by furnishing them with a summary of the plan.

(b) In response to a question, Doctor Merrill outlined the system used for allocating federal funds for aid in hospital construction. He pointed out that priorities for available funds are set according to the needs of specified areas and that one area might occupy a higher priority position one year than the next, in accordance with changes in conditions in other areas. Doctor Merrill pointed out that more than $100,000,000 in applications are now on file and that the funds available are about $5,000,000 per year at this time.

8. *California Physicians' Service:*

Doctor Francis T. Hodges, president of California Physicians' Service, reported that as of July 31, 1955, C.P.S. had 726,491 beneficiary members. He also reported that C.P.S. is working with other Blue Shield plans for the development of national enrollment plans which could cover nationwide groups of employees.

On the $6,000 C.P.S. income ceiling, Doctor Hodges pointed out that 32 of the 49 counties in northern California had approved the new ceiling but that only Ventura, Orange and San Bernardino Counties, among the nine southern counties, had done so. In the northern area, he said, 59 new groups, numbering more than 8,000 members, have been enrolled under the new income ceiling.

Doctor Hodges reported that a new family contract plan has been developed for individual enrollments and that experience under this plan has been good. A new contract, covering the year ending June 30, 1956, has been signed with the Veterans' Administration, he said. Doctor Hodges also discussed the consideration of plans to provide care for indigents and for school students.

9. *Committee on Legislation:*

Doctor Dan O. Kilroy, chairman of the Committee on Legislation, reported on the accomplishments of the recent legislative session. Messrs. Ben H. Read and Eugene Salisbury of the Public Health League of California, supplemented the report.

10. *Public Relations:*

Mr. Ed Clancy, director of public relations, discussed a pamphlet which has been sent to all members, offering supplies of pamphlets designed to improve physician-patient relationships. Discussion was also held on a pamphlet produced for a medical school alumni organization.

11. *Rollen Waterson Associates:*

Mr. Rollen Waterson discussed the importance of the $6,000 income ceiling and the new individual contracts of California Physicians' Service in maintaining high standards of prepaid medical care insurance.

12. *Commission on Medical Services:*

(a) Doctor Hollis L. Carey, chairman of the Commission on Medical Services, reported that the relative value study undertaken by a subcommittee headed by Doctor Francis J. Cox had been brought to a point where consultation with various other groups of physicians was indicated. He asked authority to present this study to such groups for their criticisms and suggestions; on motion duly made and seconded, such authority was granted.

(b) Doctor Carey also reported that the uniform insurance claims forms would be forwarded to all members of the Association in the very near future and that copies of these forms would be immediately available to all members.

(c) Doctor Carey reviewed the indigent care program undertaken in Butte County several years ago, pointing out that in three years the patients under the care of their own physicians had been treated at a cost almost identical with what the cost had previously been to the county authorities but that, during this time, care of these patients by private physicians had resulted in the saving of 2,200 hospital days; on a cost estimate of $20 per day, these savings to the county totaled $44,000.

13. *California Medicine:*

(a) Mr. Hunton suggested that the annual reports from county societies which have previously been run in the journal be eliminated and the district councilors be asked to include in their reports the important events in county societies in their districts. On motion duly made and seconded, it was voted to follow this procedure.

(b) Mr. Hunton also suggested that the verbatim transcript of the House of Delegates proceedings be dispensed with and a summary of proceedings be substituted; the complete transcript would be available in the Association office. On motion duly made and seconded, it was voted to include this recommendation to the House of Delegates in the report of the Council.

(c) A request from the Nevada State Medical Association for the appearance of a monthly page of announcements in CALIFORNIA MEDICINE was considered and, on motion duly made and seconded, was referred to the Executive Committee.

14. *Cancer Commission:*

(a) Doctor Daniels presented a pamphlet of the revised rules of the Cancer Commission for the operation of tumor boards. On motion duly made and seconded, these rules were approved.

(b) On motion duly made and seconded, the Cancer Commission was authorized to execute a contract setting forth the terms of employment for the medical director.

15. *Meeting Dates Conflict:*

Doctor Charnock reported that the change in meeting plans for the 1956 Annual Session had created a conflict with the Western Section of the American Urological Association. He suggested that the Section on Urology plan a token meeting on April 28, 1956, to be adjourned to the other meeting and that section officers be continued in office for another year. On motion duly made and seconded, it was voted to follow this procedure and to authorize the mailing of a letter to the urological members, outlining the plan.

16. *House of Delegates Resolutions:*

(a) Two resolutions referred to the Council by the House of Delegates, introduced by Doctor Herbert C. Moffitt, Jr., of San Francisco were discussed, one relating to the opening of exhibits to the public and the other to teaching material. On motion duly made and seconded, it was voted to invite Doctor Moffitt to appear before the next meeting of the Council to discuss these resolutions.

(b) A resolution by Doctor Edward C. Rosenow, Jr., referring to postgraduate medical teaching and referred to the Council by the House of Delegates, was discussed. On motion duly made and seconded it was voted to refer this resolution to the Committee on Postgraduate Education for continuing study.

17. *County Fair Exhibits:*

Doctor McPharlin presented a request from the Santa Clara County Medical Society for creation of a public relations exhibit which could be made available to county societies for showing at local county fairs. On motion duly made and seconded, it was voted to refer this request to the public relations department for consideration and report.

18. *Conference on Physicians and Schools:*

Doctor Daniels requested authority for Mr. Thomas and himself to attend a Chicago meeting

planned by the American Medical Association on conferences on physicians and schools. On motion duly made and seconded, such authority was voted.

19. *United Crusade Request:*

Doctor Shipman presented a request from the United Crusade of San Francisco for Association approval of its fund-raising campaign. Doctor Shipman had replied to the effect that he believed this to be a local matter not subject to consideration by a statewide organization. On motion duly made and seconded, this response was approved.

20. *Annual Session Meeting Places:*

Discussion was held on the places for coming annual sessions. On motion duly made, seconded and amended, it was voted that the Council's policy should be to hold two Annual Sessions in southern California and one in the northern area. In accordance with this decision, the 1956 and 1957 meetings will be planned for Los Angeles and the 1958 meeting for San Francisco.

21. *Death of Councilor Randel:*

Chairman Lum suggested that the Delegates from the Sixth Councilor District be requested to hold a caucus to select a successor for the vacancy caused by the August 19th death of Doctor Henry A. Randel of Fresno. The Council approved this suggestion and authorized the president and the council chairman to select successors to the several committee posts occupied by Doctor Randel.

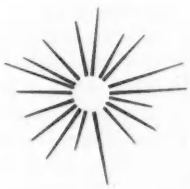
The secretary was requested to prepare a suitable resolution of sympathy to be sent to Mrs. Randel in behalf of the Council.

Adjournment:

The Council, having paid a silent tribute to Henry A. Randel, was adjourned at 4:45 p.m. out of respect to his memory.

DONALD D. LUM, M.D., *Chairman*

ALBERT C. DANIELS, M.D., *Secretary*



WITH WARNING

IMMEDIATELY REPORT TO YOUR CIVIL DEFENSE ASSIGNMENT

IF THIS IS NOT POSSIBLE, REPORT TO THE NEAREST MEDICAL INSTALLATION

WITHOUT WARNING

TAKE IMMEDIATELY AVAILABLE COVER. DO NOT LOOK AT THE BRILLIANT FLASH. IF IN CAR AND NO SHELTER AVAILABLE, STOP AT CURB, CLOSE ALL WINDOWS, TURN CAR RADIO ON, LIE ON FLOOR OF CAR.

AS SOON AS POSSIBLE CARRY OUT CIVIL DEFENSE ASSIGNMENT.

M.D.

WHAT TO DO?

KNOW YOUR C.D. ASSIGNMENT. LEARN ALL ABOUT C.D.

In Memoriam

BOWMAN, ROBERT J. Died in Los Angeles, August 19, 1955, aged 61, of coronary artery disease. Graduate of Rush Medical College, Chicago, Illinois, 1923. Licensed in California in 1923. Doctor Bowman was a member of the Los Angeles County Medical Association.

✤

CUNNANE, THOMAS B. Died in Los Angeles, August 28, 1955, aged 61, of coronary thrombosis. Graduate of the College of Physicians and Surgeons, Los Angeles, 1917. Licensed in California in 1917. Doctor Cunnane was a member of the Los Angeles County Medical Association.

✤

HAMILTON, WILLIAM F. Died in Van Nuys, August 1, 1955, aged 71, of congestive heart failure. Graduate of the University of Louisville School of Medicine, Kentucky, 1911. Licensed in California in 1943. Doctor Hamilton was a member of the Los Angeles County Medical Association.

✤

KELSEY, JOEL S., JR. Died in Los Angeles, August 15, 1955, aged 70, of coronary occlusion. Graduate of the Hahnemann Medical College and Hospital of Philadelphia, Pennsylvania, 1909. Licensed in California in 1920. Doctor Kelsey was a member of the Los Angeles County Medical Association.

✤

LEFKIN, PHILIP. Died in Duarte, August 4, 1955, aged 46, of thyroid carcinoma. Graduate of Rush Medical College, Chicago, Illinois, 1937. Licensed in California in 1937. Doctor Lefkin was a member of the Los Angeles County Medical Association.

✤

MOORE, JOHN M. Died in San Francisco, September 6, 1955, aged 51, of coronary artery disease. Graduate of the University of California Medical School, Berkeley-San Francisco, 1932. Licensed in California in 1935. Doctor Moore was a member of the San Francisco Medical Society.

✤

OWSLEY, ROBERT W. Died in San Francisco, August 15, 1955, aged 43. Graduate of the Indiana University School of Medicine, Bloomington-Indianapolis, 1934. Licensed in California in 1939. Doctor Owsley was a member of the Los Angeles County Medical Association.

✤

PAVLIDES, THEODOSIOS D. K. T. Died in Fresno, August 23, 1955, aged 66. Graduate of the National University of Athens School of Medicine, Greece, 1911. Licensed in California in 1925. Doctor Pavlides was a member of the Fresno County Medical Society.

✤

RANDEL, HENRY A. Died in Morro Bay, August 19, 1955, aged 53. Graduate of Northwestern University Medical School, Chicago, Illinois, 1929. Licensed in California in 1929. Doctor Randel was a member of the Fresno County Medical Society.

✤

SWIFT, ROBERT H. Died in San Francisco, July 28, 1955, aged 38, of acute leukemia. Graduate of Washington University School of Medicine, St. Louis, Missouri, 1943. Licensed in California in 1944. Doctor Swift was a member of the Alameda-Contra Costa Medical Association.

✤

YEISLEY, CARL J. Died in Bakersfield, August 3, 1955, aged 61, of coronary occlusion. Graduate of the University of Michigan Medical School, Ann Arbor, 1920. Licensed in California in 1929. Doctor Yeisley was a member of the Kern County Medical Society.

Henry A. Randel

IN THE PASSING of Dr. Henry A. Randel, the medical profession of Fresno and the community as a whole have suffered a great and irreplaceable loss. Doctor Randel died suddenly on August 19, 1955.

Doctor Randel was born on April 16, 1902, in Benwick, Pennsylvania. He completed his premedical studies at the University of Chicago and was graduated in medicine from the Northwestern University School of Medicine in 1929. After interning at the Fresno County General Hospital, he entered the practice of medicine in 1930, and thus began the successful fulfillment of his life's ambition.

From the very start, the personality and influence of this young physician began to be felt by the people of Fresno and by his confreres. He was a champion for good medicine and a pillar of strength to his colleagues. His kind understanding of the problems of both colleague and patient was manifest by the many who sought his advice and consultation.

He served upon many committees and held many offices. His untiring efforts on behalf of rural health in the San Joaquin Valley will never be forgotten. In 1946 he was elected president of the Fresno County Tuberculosis Association after having served 12 years as a director of that organization. He also formerly headed the Fresno County Medical Society and the California Trudeau Society.

He served as Vice-Speaker of the House of Delegates of the California Medical Association in 1951-52. Last year he was named to the American Medical Association's Rural Health Council and served as chairman of the California Medical Association's Committee on Rural Health.

With the passing of Doctor Randel we have all lost a model medical practitioner, a man with high ideals, a man whose word was his bond, and above all, a fearless physician who dedicated his life to the principles for which medicine stands.

To his widow, Mrs. Christine Randel, and the surviving members of the family, we tender our heartfelt sympathy and express our own great sorrow at the passing of such an outstanding husband, father and member of our medical fraternity.

Doctor Randel has earned his future reward and we who survive will long remember this man, for he was one of the pillars upon which medicine rested in this community. His memory will serve as inspiration to those who aspire to perform so great a public service.

FRED E. COOLEY, M.D.

Annual Meeting

Ambassador Hotel

LOS ANGELES

April 29 - May 2, 1956

Papers for Presentation

If you have a paper that you would like to have considered for presentation, it should be submitted *to the appropriate section secretary* (see list on this page) not later than November 19, 1955.

Scientific Exhibits

Space is available for scientific exhibits. If you would like to present an exhibit, please write immediately to the office of the California Medical Association, 450 Sutter Street, San Francisco 8, for application forms. To be given consideration by the Committee on Scientific Work, the forms, completely filled out, must be in the office of the California Medical Association not later than December 1, 1955. (No exhibit shown in 1955, and no individual who had an exhibit at the 1955 session, will be eligible until 1957.)

SCIENTIFIC PAPERS

SCIENTIFIC EXHIBITS

PLANNING MAKES PERFECT

AN EARLY START HELPS

SECRETARIES OF SCIENTIFIC SECTIONS

ALLERGY . . . . . **William J. Kerr, Jr.**
711 D Street, San Rafael

ANESTHESIOLOGY . . . . . **Robert W. Churchill**
1180 Montgomery Drive, Santa Rosa

DERMATOLOGY AND SYPHILOLOGY . . **Anker K. Jensen**
1052 West Sixth Street, Los Angeles 17

EAR, NOSE AND THROAT . . . . **E. Gordon McCoy**
490 Post Street, San Francisco 2

EYE . . . . . **Channing W. Hale**
174 Nemaha Street, Pomona

GENERAL MEDICINE . . . . . **Harold C. Sox**
300 Homer Avenue, Palo Alto

GENERAL PRACTICE . . . . . **T. Jackson Laughlin**
10910 Riverside Drive, North Hollywood

GENERAL SURGERY . . . . . **Orville F. Grimes**
U. C. Medical Center, San Francisco 22

INDUSTRIAL MEDICINE AND SURGERY . . . . . **Homer S. Elmquist**
629 So. Westlake Avenue, Los Angeles 57

OBSTETRICS AND GYNECOLOGY . . . **Ralph C. Benson**
U. C. Medical Center, San Francisco 22

ORTHOPEDICS . . . . **A. B. Sirbu (Acting Secretary)**
450 Sutter Street, San Francisco 8

PATHOLOGY AND BACTERIOLOGY . . **Justin R. Dorgeloh**
378 Thirtieth Street, Oakland 9

PEDIATRICS . . . . . **Moses Grossman**
U. C. Medical Center, San Francisco 22

PSYCHIATRY AND NEUROLOGY . **William F. Northrup, Jr.**
696 East Colorado Street, Pasadena 1

PUBLIC HEALTH . . . . . **Wilber J. Menke, Jr.**
City Hall, Pasadena 1

RADIOLOGY . . . . . **Austin R. Wilson**
540 North Central Avenue, Glendale 3

The Part Played by Your Auxiliary in Civil Defense

In the event of disaster, doctors' wives may face a significant and challenging responsibility: They may expect the full burden of home defense to fall on their shoulders. With their husbands at community disaster centers outside the home, the survival of their children and home personnel may well depend on their knowing what to do.

A Civil Defense program is, therefore, of vital importance to members of the Woman's Auxiliary. Our need of authoritative information is perhaps even greater than that of the women who may hope to have their husbands help them in a time of attack.

Recognizing the growing urgency of this need, your Auxiliary in 1952 set up a Civil Defense Committee with a three-fold purpose: (1) to cooperate with the Office of Civil Defense; (2) to familiarize its members with current civil defense procedures; (3) to interest its members in their local civil defense activities.

Our last year's chairman of Civil Defense, Mrs. Louis Olker of Chico, explains how your auxiliary committee has been set up to cope with the problems:

"Each county president appoints a Civil Defense chairman to attend Civil Defense Council meetings as a member of the local council. The chairman familiarizes herself with the local program for the Auxiliary area and, in turn, reports all important data to the general Auxiliary membership at a regular meeting on Civil Defense.

"The Auxiliary is well aware that there are distinctive geographical problems in each area. Hence the planning for each area must differ—and there must be specifically designed plans for action in each Auxiliary locale.

"Since it is to the distaff side of the family that immediate action will fall at the time of an atomic strike, education in that direction should be of primary importance. Also, elaborate plans are not necessary."

Mrs. Olker has gleaned the following "rules for survival" from her year's experience, for Auxiliary —as well as general—use:

1. With the advent of the H-bomb, the entire state of California will become a fall-out area in which evacuation for the first period will become secondary in most instances to the immediate need for self-preservation, and will require a longer period of time than was first anticipated. Therefore, food, first aid, and other supplies will be needed in greater quantities to last three weeks rather than the three days formerly advocated.
2. A foxhole will still serve in extreme emergency as protection from heat, flash and other side effects of explosion.
3. A family underground shelter should be planned and stocked in advance.
4. A battery-type radio will be indispensable for receiving local directives broadcast from specially built Civil Defense trucks in each region.
5. A bar of detergent soap will serve many more purposes than the bottle of antiseptic originally called for among first aid supplies.
6. Clean bedsheets will have more uses than prepackaged gauze bandages.
7. Supplies in the deep freeze can be used.
8. Articles such as canned heat and flashlights with extra batteries can be stored easily.
9. Concentrated foods and small first aid kits should be ready to carry compactly should the order to evacuate be given.

Mrs. C. R. Kroeger, our chairman of Civil Defense for the current year, is stressing to our membership the importance of being familiar with the various "alerts." The recent and short-lived yellow alert staged by the Air Force in May pointed up the necessity of both Civil Defense personnel and the public knowing what to do.

Your Auxiliary's Civil Defense program is, of course, keyed in with that of the Woman's Auxiliary to the A.M.A. The national Auxiliary is this year fostering a program of home training which would see at least one member in each doctor's family trained in home nursing or first aid. We are endorsing and working for this project, too.

There is, unfortunately, less enthusiastic support of your Auxiliary's Civil Defense program than there is of many other Auxiliary activities. This is probably owing to the general public apathy, the necessarily frequent changes in the program of the Civil Defense Administration, and the difficulty of encompassing and accepting the enormous complexities of H-bomb defense.

In recognition of this situation, the current program of your Woman's Auxiliary — coordinated with that of the Woman's Auxiliary to the A.M.A. —is aiming for a ten per cent active participation in Civil Defense among its members' families. This means a goal this year of at least ten per cent member-homes with adequate shelters and food supplies; ten per cent of member-homes with one family member trained in first aid or home nursing. We hope that once this goal is achieved, we can look forward to ever greater participation in our vitally important Civil Defense program.

NEWS & NOTES

NATIONAL • STATE • COUNTY

ALAMEDA

The third annual convention of the **California League for Nursing** will be held at the Hotel Leamington, Oakland, October 20-22. At an open meeting Ruth B. Freeman, president of the National League for Nursing and associate professor of public health administration at Johns Hopkins, will address the convention on the trends and plans ahead of nursing service.

LOS ANGELES

The new officers of the **Los Angeles Radiological Society** for 1955-56 are as follows: President, Dr. George Jacobson, Los Angeles; vice-president, Dr. Hubert J. Pichard, Long Beach; treasurer, Dr. Samuel C. Kahlstrom, Los Angeles; secretary, Dr. Richard A. Kredel, Pasadena.

* * *

Grants totaling $7,400 for **continuing studies of nephrosis** have been awarded to five Los Angeles physicians by the Los Angeles chapter of the National Nephrosis Foundation. The recipients are Dr. Robert I. Boyd, University of Southern California department of medicine; Dr. George N. Donnell, Children's Hospital; Dr. Daniel H. Simmons, University of California department of medicine; Dr. Yale J. Katz, University of Southern California department of medicine, and Dr. Hans H. Zinsser, University of Southern California department of surgery.

* * *

Dr. Eugene F. Hoffman, Los Angeles, recently was appointed to the medical advisory board of the Sears-Roebuck Foundation. The board, which is made up of 16 medical authorities from all parts of the United States, advises the foundation on medical research and education programs.

SAN FRANCISCO

The first western divisional convention of the **American Psychiatric Association** will be held in San Francisco at the St. Francis Hotel, October 27-30, 1955, as a joint meeting with the West Coast Psychoanalytic Societies.

The Northern California Psychiatric Society and the San Francisco Psychoanalytic Society will be the host societies.

This is the first time the American Psychiatric Association has held a regional meeting and if the San Francisco meeting is successful, more will be held in the future throughout the United States.

Further information may be obtained from Dr. Alfred Auerback, president of the Northern California Psychiatric Society, or Dr. Thomas A. Gonda, secretary-treasurer, 2351 Clay Street, San Francisco.

* * *

The Allergy Foundation of Northern California has been granted $3,500 from the estate of Joseph A. Murphy by the San Francisco Foundation to be used for a field survey of important pollinating plants in northern California. The purpose of the present survey is to determine the distribution of plants commonly producing asthma, hay fever, eczema, and other allergic diseases in this area. It is estimated that the survey will take approximately two to two and a half years to complete. The results and findings of the survey are to be published in book form, available to the medical profession.

* * *

Dr. Dohrmann K. Pischel, clinical professor of surgery at Stanford School of Medicine, has been appointed head of the division of ophthalmology in the department of surgery to succeed Dr. Edward Maumenee who resigned to accept a position as director of the department of ophthalmology at Johns Hopkins.

SAN MATEO

Full accreditation by the Joint Commission on Accreditation of Hospitals was received last month by the **Peninsula Hospital,** Burlingame.

SANTA CLARA

O'Connor Hospital, San Jose, was notified last month that it has been given full accreditation by the Joint Commission on Accreditation of Hospitals. Notification was given in a letter to Sister Helen, administrator of the hospital, from Dr. Kenneth Babcock, director of the Joint Commission.

GENERAL

Evaluation of practical experience with the **Salk polio vaccine** by key figures in its development will be a feature of the 83rd annual meeting of the American Public Health Association and meetings of 40 related organizations in the Kansas City, Missouri, Municipal Auditorium, November 14-18. Participants in a panel discussion on Thursday afternoon, November 17, will include Dr. Jonas E. Salk, University of Pittsburgh, who developed the vaccine; Dr. Thomas Francis, Jr., University of Michigan, who directed evaluation of field tests which led to its adoption; Dr. Leonard A. Scheele, Surgeon General, U. S. Public Health Service; Dr. Hart E. Van Riper, medical director of the National Foundation for Infantile Paralysis, and Dr. Robert E. DeFries, University of Toronto. The moderator will be Dr. Malcolm E. Merrill, director of Public Health, State of California.

* * *

The Western Institute on Epilepsy and the Western Society of Electro-Encephalography will hold their 1955 annual meetings November 10-12 at the Hotel Westward Ho, Phoenix, Arizona. The meetings are cosponsored by the Arizona chapter of the American Academy of General Practice and the University of Utah School of Medicine. Dr. Wilder Penfield, director of the Montreal Neurological Institute, will be a guest speaker.

* * *

Trustees of the **Caleb Fiske Prize** of the Rhode Island Medical Society have announced as the subject for this year's dissertation, "Use of Radioactive Isotopes in the Treatment and Investigation of Disease." The dissertation must be typewritten, double spaced, and should not exceed 10,000 words. A cash prize of $350 is offered.

Complete information regarding the contest may be obtained from the Caleb Fiske Fund, Rhode Island Medical Society, 106 Francis Street, Providence 3, Rhode Island.

POSTGRADUATE
EDUCATION NOTICES

THIS BULLETIN of the dates of postgraduate education assemblies and the meetings of various medical organizations in California is supplied by the Committee on Postgraduate Activities of the California Medical Association. In order that they may be listed here, please send communications relating to your future medical or surgical programs to: Mrs. Margaret H. Griffith, Assistant Director, Postgraduate Activities, California Medical Association, 417 South Hill Street, Los Angeles 13.

UNIVERSITY OF CALIFORNIA AT LOS ANGELES

Basic Course in Ophthalmology, Wednesdays, October 19, 1955, to May 23, 1956. Fee: $125.

Application of Principles of Industrial Medicine to Private Practice, Wednesday evenings, October 19 to December 14, 1955. Fee: $40.

Aviation Medicine, Wednesday, Thursday and Friday, October 26, 27, and 28, 1955. Fee: $50.

Pediatrics, Thursday, Friday and Saturday, October 27, 28 and 29, 1955. Fee: $50.

Three Symposia: SAN DIEGO, Wednesdays, October 26, November 2 and 9, 1955—(a) Burns, one-half day. Repair of Superficial Wounds, one-half day; (b) Radioisotopes; (c) Surgery of the Hand. Fee: $17.50 for one, or $50 for all three.

Contact: Thomas H. Sternberg, M.D., Assistant Dean for Postgraduate Medical Education, U.C.L.A., Los Angeles 24.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

In San Francisco:

Conference on Applied Therapeutics—October 17, 18 and 19.

Conference on Gynecology and Obstetrics—October 20 and October 21.

Ophthalmological Conference—December 5 to December 7.

In Berkeley:

Postgraduate Institute—Wednesday evenings, Herrick Memorial Hospital, October 19 through November 23.

Contact: Seymour M. Farber, M.D., Head, Postgraduate Instruction, Office of Medical Extension, University of California Medical Center, San Francisco 22.

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES

In Los Angeles:

No. 873: Cardiac Resuscitation. Sponsored by the Los Angeles County Heart Association. Each Wednesday throughout the year, U.S.C. Medical Research Building. $30 per session.

No. 878: Physical Medicine for General Practitioners. Every morning, October 31 to November 10. Forty hours. Fee: $50.

Contact: Phil R. Manning M.D., Director of Medical Extension Education, University of Southern California School of Medicine, 2025 Zonal Avenue, Los Angeles 33.

COLLEGE OF MEDICAL EVANGELISTS

Anesthesiology. Daily, full-time, four months, beginning each four months. Fee: $300.

Contact: Chairman, Section on Graduate and Postgraduate Medicine, College of Medical Evangelists, 1720 Brooklyn Ave., Los Angeles 33.

CALIFORNIA MEDICAL ASSOCIATION, POSTGRADUATE ACTIVITIES CIRCUIT COURSES

NORTH COAST CIRCUIT in association with Stanford University School of Medicine:

Eureka—Monday, October 17, 24, 31, November 7.
Ukiah—Tuesday, October 18, 25, November 1, 8.
Woodland—Wednesday, October 19, 26, November 2, 9.
Napa—Thursday, October 20, 27, November 3, 10.

SACRAMENTO VALLEY CIRCUIT in association with University of California School of Medicine, San Francisco:

Dunsmuir—Monday, October 17, 24, 31, November 7.
Chico—Tuesday, October 18, 25, November 1, 8.
Marysville—Wednesday, October 19, 26, November 2, 9.
Auburn—Thursday, October 20, 27, November 3, 10.

POSTGRADUATE INSTITUTES

SOUTHERN COUNTIES in association with the University of Southern California School of Medicine, January 19-20, 1956, at Laguna Beach.

WEST COAST COUNTIES in association with College of Medical Evangelists, March 1-2, 1956, in Carmel.

NORTH COAST COUNTIES in association with University of California School of Medicine, San Francisco, mid-March, 1956, in Santa Rosa.

SAN JOAQUIN VALLEY COUNTIES in association with the University of California School of Medicine, Los Angeles, April 5 and 6, 1956, in Fresno.

SACRAMENTO VALLEY COUNTIES in association with Stanford University School of Medicine, June 21, 22, 1956, at Lake Tahoe.

Contact: C. A. Broaddus, M.D., Director of Postgraduate Activities, P.O. Box A-1, Carmel, California, or Mrs. Margaret H. Griffith, Assistant Director, California Medical Association, 417 So. Hill St., Los Angeles 13.

Medical Dates Bulletin

OCTOBER MEETINGS

STATE BOARD OF MEDICAL EXAMINERS Written Examination, Sacramento, October 17-20.†

Mid-October—AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY Examinations, San Francisco.

Contact: David A. Boyd, M.D., Secretary, 102-110 Second Avenue, S.W., Rochester, Minn.

AMERICAN OCCUPATIONAL THERAPY ASSOCIATION, 38th Annual Conference and Institute. Sheraton-Palace Hotel, San Francisco, October 25 to 28.

Contact: Henrietta McNary, OTR, president, American Occupational Therapy Association, 33 W. 42nd Street, New York 36, N. Y.

WESTERN DIVISIONAL CONVENTION OF AMERICAN PSYCHIATRIC ASSOCIATION, joint meeting with the West Coast Psychoanalytic Societies. St. Francis Hotel, San Francisco, October 27 to 30.

Contact: Alfred Auerback, M.D., president, Northern California Psychiatric Society, 450 Sutter St., San Francisco, or Thomas A. Gonda, M.D., secretary-treasurer, 2351 Clay St., San Francisco.

NOVEMBER MEETINGS

AMERICAN MEDICAL ASSOCIATION Clinical Session, 1955, in Boston, November 29 to December 2, 1955.

CITY OF HOPE MEDICAL CENTER, Newer Developments in the Diagnosis and Treatment of Cancer, November 28, 29, 30. All physicians invited to attend.

Contact: Leo G. Rigler, M.D., City of Hope Medical Center, Duarte, Calif.

STATE BOARD OF MEDICAL EXAMINERS Oral Examination for Reciprocity Applications, San Francisco, November 12.†

STATE BOARD OF MEDICAL EXAMINERS Oral and Clinical Examinations for Foreign Medical School Graduates, San Francisco, November 13.†

DECEMBER MEETINGS

MEDICAL ALUMNI COMMITTEE OF CHILDREN'S HOSPITAL, San Francisco, December 2, 9:30 a.m.* Prenatal Problems, Departments of Obstetrics, Anesthesia, Pediatrics and Public Health, participating.

REGIONAL CONFERENCE ON PHYSICIANS AND SCHOOLS, San Jose, December 2 and 3.

Contact: Talcott Bates, M.D., 920 Cass Street, Monterey.

AMERICAN COLLEGE OF CHEST PHYSICIANS, Ambassador Hotel, Los Angeles, December 5-10. Los Angeles Postgraduate Course on Diseases of the Chest.

Contact: Alfred Goldman, M.D., Chairman, 416 North Bedford Drive, Beverly Hills.

JANUARY MEETINGS

LOS ANGELES MIDWINTER MEDICAL CONVENTION, January 3, 4, 5, 1956, Biltmore Hotel, Los Angeles. An 85th anniversary, sponsored by Los Angeles County Medical Association.

Contact: Jerry L. Pettis, Public Relations Counsel, Los Angeles County Medical Association, 1925 Wilshire Blvd., Los Angeles 57. Telephone DUnkirk 5-1581.

MEDICAL ALUMNI COMMITTEE OF CHILDREN'S HOSPITAL, San Francisco, January 14, 1956.* Pediatric Surgery, with special emphasis on diagnosis, referral, preparation, pre- and postoperative care.

SPRING MEETINGS

MEDICAL ALUMNI COMMITTEE OF CHILDREN'S HOSPITAL, San Francisco, March 17, 1956.* Morning: Dermatology. Afternoon: Nutritional problems peculiar to modern pediatrics.

MEDICAL ALUMNI COMMITTEE OF CHILDREN'S HOSPITAL, San Francisco, April 14, 1956.* Behavior Problems and Childhood Psychiatry.

CALIFORNIA MEDICAL ASSOCIATION ANNUAL MEETING, Ambassador Hotel, Los Angeles, April 29-May 3, 1956.

Contact: John Hunton, Executive Secretary, 450 Sutter St., San Francisco 8, or Ed Clancy, Director of Public Relations, 417 S. Hill St., Los Angeles 13.

AMERICAN COLLEGE OF PHYSICIANS 37TH ANNUAL SESSION, Los Angeles, April 16-20, 1956.

Contact: George C. Griffith, M.D., General Chairman, Box 25, 1200 N. State St., Los Angeles 33.

CALIFORNIA HEART ASSOCIATION ANNUAL MEETING AND SCIENTIFIC SESSION, La Playa Hotel, Carmel, May 18 to 20, 1956.

Contact: Alan Croft Blanchard, field director, California Heart Association, 1428 Bush Street, San Francisco 9.

**For registration or information, contact:* Gertrude Jones, M.D., Children's Hospital, San Francisco.

†*For information contact:* Louis E. Jones, M.D., secretary-treasurer, California State Board of Medical Examiners, Room 536, 1020 N Street, Sacramento. (Note: Applications must be on file at least two weeks before examination dates.)

THE PHYSICIAN'S *Bookshelf*

HANDBOOK OF TREATMENT. Harold Thomas Hyman, M.D. J. B. Lippincott Company, Philadelphia, 1955. 511 pages, $8.00.

The introduction states that this book is intended for convenient and realistic use by general practitioners and specialists. The author has attempted to produce an accurate and concise guide in therapy. The table of contents is presented alphabetically and the entire book follows in this order (with synonyms in parenthesis below the chosen title).

The plan of presentation is the author's own. Each subject opens with a brief review of the general principles considered in it. Following a general statement the therapy is catalogued under the categories Immediate Care, Continuing Care (favorable course), Continuing Care (unfavorable course), Continuing Care (progressively unfavorable course). In the latter the practitioner, "mustering every defensive weapon in his therapeutic armamentarium . . . battles to gain mastery over those forces that threaten the well being of his patient."

There is no doubt that the amazing Dr. Hyman has given us an amazing amount of factual information compressed into a comparatively small volume of some 500 pages. This volume can be very useful to the general doctor once he masters the particular style and arrangement of the contents. However, he—like the reviewer—may find it hard to stomach the consistently authoritarian and dogmatic presentation.

And there are occasional slipups: The premature damning of tetracyclin (page 434) discloses that the author hasn't kept up quite well enough with the literature on the broad spectrum antibiotics. The reviewer is unable to understand the author's repeated preference for Benzedrine over the much less symptom producing Dexedrine.

* * *

MANAGEMENT OF ADDICTIONS. Edward Podolsky, M.D., Editor. Philosophical Library, New York, 1955. 413 pages, $7.50.

This volume contains 35 short chapters which are devoted to the problems of addiction to alcohol, sedatives and narcotics. Each chapter is a complete article and, in addition, most contain a summary by the contributor. Many of the articles are reprints originally published in 19 of the most widely read medical journals, and are written by the best authorities in their respective fields. Dr. Podolsky grouped and edited these articles in a way that provides a continuity of subject matter.

In the discussion of alcoholism, its importance is emphasized in that it is the fourth American disease, following heart disease, cancer and tuberculosis. The incidence is apparently increasing, especially among young people and women. It causes a monetary loss of one billion dollars a year, and involves between four and five million people. In addition to the management of addiction to alcohol, the causes are discussed from various viewpoints, particularly psychological and physiological. The management of alcohol addiction includes conditioned reflex therapy, endocrine therapy, psychotherapy, hypnotherapy, use of Alcoholics Anonymous, and the articles describe the action and uses of various drugs, tolserol, antibuse, benadryl, mebaral, disulfiran, barbiturates, calcium and of carbon dioxide therapy. The genetotrophic approach, which is a comparatively new concept, is still in the research stage. Time and further investigation will probably reveal its merits. The total push method stresses the emotional, physical, environmental, recreational and associated activities. All the contributors stress the fact that alcoholism cannot be treated with one drug, or one method, but is most effectively managed by a combination of therapies.

Part two deals in much the same manner with the management of narcotic addiction. The merits of rapid or slow withdrawal, and of various medications used, are discussed. Treatments with electric shock, deep sleep, benadryl, barbitals and substitute therapies are reviewed.

The volume should be of real value to all physicians, general practitioners as well as specialists, who are treating addictions. Brief case histories are given to illustrate all the various methods of treatment and are well documented. The treatments are carefully itemized with the type of medication to give, and with the exact amounts indicated. Adverse reactions are also effectively described. Psychotherapeutic procedures are briefly detailed. The general subject matter presents a picture of the problem that would be of value and interest to the social worker, psychologist and to others interested in addiction management.

There is some overlapping in the collection of papers which is unavoidable when there are between 40 and 45 contributors. However, it probably indicates that there is a gradual swing to a more uniform treatment.

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PRACTICAL MEDICAL MYCOLOGY. Edmund L. Keeney, A.B., M.D., Formerly in Charge of the Mycology Laboratory and Instructor in Medicine, Johns Hopkins University School of Medicine. Charles C. Thomas, Publisher, Springfield, Illinois, 1955. 145 pages, $4.50.

Practical Medical Mycology is a brief, easy-to-read book on the fungi pathogenic to man. It is designed for the practicing physician, teacher and student and adequately fulfills the need for a small, compact book to clarify subject matter that is rapidly becoming of greater interest in medicine.

Diagrammatic illustrations of each mycotic disease greatly aid the reader to assimilate information that is often written using forbidden, esoteric nomenclature. Each disease is discussed as to history, incidence of infection, symptomatology, mycology, skin and serological tests, and treatment. The brief chapters on the spores of fungi as allergens and on poisonous fungi will be of general interest.

The lack of detailed mycological descriptions, photomicrographs and sections on pathology make this book of little use for the laboratory or for those readers having a more than casual interest in mycology.

ANNUAL REVIEW OF MEDICINE — Volume 6 — 1955. David A. Rytand, Editor and John Anderson, Associate Editor, Stanford School of Medicine, Annual Reviews, Inc., Stanford, Calif., 1955. 459 pages, $7.00.

In a scholarly introduction Bloomfield discusses the problem of keeping up with the medical literature: "The result of this vast plethora of medical writing, now completely out of hand from the standpoint of the potential reader, is a frantic attempt on all sides to concentrate, abbreviate, abstract and condense a subject in such fashion that the doctor has some faint chance of covering the ground. Some of these attempts are good and useful, others unfortunately introduce a new form of distemper: The reviewer or compiler faced by a vast and often highly specialized literature issues an article which is little more than a list of titles, and which is really almost useless.

"It is obvious then that the reviewer must carefully select the useful and important contributors; he must weave them into something of a coherent whole. He must assume that his readers are not already familiar with the intimate details of the subject . . . It is his task to synthesize the important advances in a subject in such fashion that a vivid story captures the reader's interest."

These conditions are fulfilled better in the Annual Review of Medicine than in any of its compeers with which this reviewer is familiar. Designed especially for those in teaching and research it can be useful to students and to practicing physicians with an established background of knowledge. The topics are covered in a manner both selective and directed, and for the most part thorough and interesting. The volume is heartily recommended.

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DIFFERENTIAL DIAGNOSIS OF INTERNAL DISEASES—Clinical Analysis and Synthesis of Symptoms and Signs on Pathophysiologic Basis — 2nd Revised Edition. Julius Bauer, M.D., F.A.C.P., Clinical Professor of Medicine, College of Medical Evangelists, Los Angeles. Grune & Stratton, New York, 1955. 987 pages, $15.00.

This is the second edition of a book already recognized as a stimulating work on signs and symptoms as applied to differential diagnosis of disease. The subtitle is stated as "Clinical Analysis and Synthesis of Symptoms and Signs on Pathophysiologic Basis." In line with this the reader is oriented early in the book by a scholarly examination of signs and symptoms; the most likely mechanisms involved in their occurrence are discussed and liberally illustrated with cases drawn from the author's own experience. The known facts and basic principles enumerated in earlier chapters are applied later to disorders of various systems. A large mass of material has been organized and compressed without loss of any of the essentials and is presented by the author in a readable narrative style. Throughout, the author has retained what is established and useful in a differential diagnosis of disease and has flavored this with little known or unusual information culled from the world literature and his own wide experience. Included also are new methods, disease entities, and mechanisms which have been elucidated since the first edition of this book (some examples are agammaglobulinemia as related to infections, cat scratch fever, chlorpromazine jaundice as diseases mentioned; and urinary catechols in pheochromocytoma and radioactive gold in tumor localization as diagnostic techniques). Throughout, the reader feels stimulated to review the extensive and well chosen bibliography. The summaries recorded at the end of each chapter help fix the contents of the chapter in the reader's mind in a most gratifying manner.

Perhaps the chapter on electrocardiography may well have been omitted, since there are excellent books on the subject. It is difficult to see how electrocardiography can be profitably discussed in a few pages without accompanying photographs and illustrative tracings.

On occasion, the author after a well documented discussion of an established pathophysiological mechanism producing signs and symptoms will go beyond the implications of the supporting data to draw inferences in post hoc fashion. This serves to create a feeling of "patness" which one does not anticipate in a scientific work of this kind and thus subtly tends to tax, somewhat, the credulity of the reader. Additionally, the illustrative cases used by the author to emphasize his point on occasion do not seem pertinent to the discussion and tend to divert the reader from the subject at hand rather than to highlight the salient points.

When considered as a whole, however, this book presents a review of signs, symptoms and techniques concerned in a differential diagnosis of disease organized into an integrated system and written in a thoughtful manner with emphasis placed, properly, on clinical values and the more important and common disease entities. This reviewer feels that the author has succeeded in making this book an easily usable, effective teaching instrument; for anyone interested in reviewing the relative merits of the various factors entering into differential diagnosis of disease, this work provides excellent guidance.

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DOCTORS IN THE SKY—The Story of the Aero Medical Association. Robert J. Benford, M.D., Colonel, Medical Corps, United States Air Force. Charles C. Thomas, Publisher, 301 East Lawrence Ave., Springfield, Ill., 1955. 326 pages, $8.75.

"Doctors in the Sky" is a carefully documented history of the founding and development of the Aero Medical Association, the pioneer organization for aviation medicine in the United States. The difficulties encountered early in the days of aviation medicine are recalled in chronological order. The efforts to seek a rightful place for medicine in aviation, in keeping with the rapid development of aviation in the first half of the century, are revealed in painstaking detail, often, however, at the expense of the pace of the story. Colonel Benford has done an admirable job in describing the events associated with the Aero Medical Association. The biographies of its first 26 presidents are summarized in sequence as they take office.

Although this history will have a limited appeal, particularly to those men interested in aviation medicine, it will serve as a carefully recorded history for the Aero Medical Association. The format is excellent, the illustrations are good, and the style is pleasant. It will serve as a good reference for army, navy and civilian flight surgeons.

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WHEN MINDS GO WRONG—The Truth About Our Mentally Ill and Their Care in Mental Hospitals. John Maurice Grimes, M.D., formerly Staff Member of the Council on Medical Education and Hospitals, American Medical Association. The Devin-Adair Company, 23 East 26th Street, New York 10, N.Y., 1954. 246 pages, $3.50.

This is a revision of a work originally published in 1951. The author has made an extensive survey of mental hospitals. This book is largely concerned with a very bitter and detailed criticism of the institutions, the personnel and the politicians. There is also a brief presentation of the author's overly simplified theories of mental illness and a rather vague idealistic plan for a new type of therapeutic village to replace the present mental hospitals. There is undoubtedly much of truth in what the author says. However, the overwhelming, continued, wholesale condemnation of everyone except the author grows tiresome and the reviewer doubts if the book will be widely read or accomplish much.

HEART DISEASE—Its Diagnosis and Treatment—Second Edition. Emanuel Goldberger, M.D., F.A.C.P., Associate Attending Physician, Montefiore Hospital, New York. Lea & Febiger, Philadelphia, 1955. 781 pages, $12.50.

This book aims to encompass the entire field of diseases of the heart. It makes a valiant effort to accomplish this purpose within the not too voluminous space of 766 pages. Many important subjects are covered too briefly, and therefore a comprehensive clinical picture of many entities cannot be given nor is this a broad reference source.

The description of cardiac symptomatology and cardiac and pulmonary function tests is thorough and the relation to basic physiology is well expressed. There may be serious differences of opinion, however, from the author's expressed explanations of certain fundamental physiologic processes. The chapters on roentgenology, electrocardiography and ballistocardiography cover the essential features of these procedures competently for the brief space allotted.

The description of cardiac catheter findings, with an accompanying table, point out gross changes that may be expected in various cardiac defects, but this information only serves to indicate the usefulness of this procedure. Current knowledge of the significant and sometimes deceptive variations in pressures, blood flows and oxygen content is not presented. One desires a more definite appraisal by the author of the advantages and danger of certain therapeutic measures, rather than the frequent use of the general and weaker descriptive terms of "can" and "may." At times, however, the author expresses personal opinions which are in conflict with some currently well accepted concepts. Examples of these are rheumatic heart disease as a general rule is a poor obstetrical risk if the patient is over 35 years of age, and that the enlargement of the cardiac silhouette by roentgenogram in acute pericarditis is due to cardiac enlargement and not to pericardial fluid; that the low diastolic blood pressure in aortic insufficiency is due to "sucking blood back into the heart"; and that the primary therapy of mitral stenosis (presumably symptomatic) is medical and not surgical.

Certain statements are made which demand challenge, as for example: That emphysema without heart failure results in elevated venous pressure; that the Blalock-Taussig procedure is indicated for "pure" pulmonic valve stenosis with a patent foramen ovale; and that cyanosis (rather than systemic venous engorgement) is the distinctive clinical sign of Ebstein's Complex (erroneously indexed as Epstein's anomaly).

This book will serve to give the student, and those desirous of acquiring a basic knowledge of heart disease, a broad but brief coverage of the subjects. It includes in its 51 chapters a wide range of clinical entities, including the rheumatic defects; coronary artery disease; the congenital abnormalities; miscellaneous causes of myocardial disease; and the relation of surgery, pregnancy and employment to heart disease. It is well-indexed and contains short bibliographies following each chapter.

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MEDICINE FOR NURSES—Sixth Edition. W. Gordon Sears, M.D. (Lond.), M.R.C.P. (Lond.), Physician Superintendent, Mile End Hospital, London, Examiner to the General Nursing Council for England and Wales. Edward Arnold Publishers Ltd., London. Distributed by Williams and Wilkins Company, Baltimore, 1954. 520 pages, $4.00.

The sixth edition of this British textbook for nurses has been thoroughly revised with many sections rewritten, and consequently many of the deficiencies noted in the previous edition have been corrected. Treatment, particularly, has been brought up to date. Practically all of the newer drugs and concepts of therapy which the present day nursing student is likely to encounter are mentioned and adequately described. The close correlation between various medical diseases and the nurse's role in treatment are emphasized and concisely presented. There appears to be less chance of confusion between nurses' and physicians' responsibilities in the present edition than previously. More illustrations have been added, to a total of 80.

More serious deficiencies noted in the fifth edition persist in the present volume, however. As a standard textbook to be used in most American schools of nursing this book is too brief. Important and frequently encountered diseases such as primary atypical pneumonia and homologous serum jaundice are not even mentioned. Larger more comprehensive volumes are available and undoubtedly will be preferred.

Medical and drugs terms used are British and, although the word more familiar in this country is given frequently in parentheses, confusion can result.

As a textbook for review of nursing medicine or as a source of quick and concise reference on the medical wards this volume could be useful.

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OBSTETRICS—11th Edition. J. P. Greenhill, M.D., Senior Attending Obstetrician and Gynecologist, The Michael Reese Hospital, Professor of Gynecology, Cook County Graduate School of Medicine. W. B. Saunders Company, Philadelphia, 1955. 1088 pages, 1170 illustrations on 910 figures, 144 in color, $14.00.

This volume is the 11th edition of the standard textbook on obstetrics originally written by J. B. DeLee, subsequently revised and rewritten under the editorship of J. P. Greenhill. The immediately preceding revision appeared in 1951, so that the present volume represents an up-to-date work embodying the commonly accepted principles of modern obstetric practice. Greenhill adopts a fairly middle-of-the-road approach to most obstetrical problems, and the recommendations and treatment are sufficiently conservative to permit the use of this book as a textbook and general handbook. Most of the viewpoints, expressed or implied, carry a strong personal flavor, but this is the author's style and cannot be termed objectionable. Some outmoded procedures, such as home delivery preparations and intrauterine bag usage, are given an inordinate amount of consideration, but modern concepts concerning retrolental fibroplasia and total cesarean hysterectomy are well documented. Discussion of toxemia could be improved. This book will continue to find usefulness as a text for medical students and those interested in general obstetrical practice.

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PATHOLOGY. Peter A. Herbut, M.D., Professor of Pathology, Jefferson Medical College and Director of Clinical Laboratories, Jefferson Medical College Hospital. 1227 pages, 651 figures, 6 color plates, $16.00.

This is a new textbook of Pathology intended for undergraduate or postgraduate students of medicine. It is nicely illustrated, mostly by reproductions of photographs which are technically excellent. References at the end of each chapter cite only publications in the English language, but are representative and are clearly marked to indicate their content.

The book is intended as a general presentation unadorned by unnecessary details. As a result it is quite didactic, with emphasis upon enumeration of descriptive features of disease and relatively little discussion of pathogenesis or significance of pathological changes. When lists of causes or factors in disease are given there is frequently no attempt to evaluate their relative importance. Critical analysis of conflicting ideas is not attempted.

TRANSACTIONS OF THE AMERICAN COLLEGE OF CARDIOLOGY—Volume IV—1954. Editors, Simon Dack, M.D., and Bruno Kisch, M.D. Published by the American College of Cardiology, 140 West 57th Street, New York 19, N. Y., 1955. 319 pages, $5.00.

This volume presents the papers of the Third Annual Convention of the American College of Cardiology held in Chicago in May, 1954. Very little new material was presented but a number of interesting reviews and personal opinions were expressed. The importance of diet in various types of cardiac disease has been given a good deal of attention in various panels with particular emphasis on restriction of salt, calories, and fat.

Gofman has a number of contributions indicating his present position with respect to diet and lipoproteins. The paper by Dack and Robbin, in which they have reviewed the predisposing and causative factors of atherosclerosis, is particularly timely. The surgical aspects of cardiac disease are mentioned briefly, but the newer aspects of surgical treatment are underplayed.

The book will be of interest for those wishing to have discussions of selected items in the cardiological field.

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THE KIDNEY—Ciba Foundation Symposium. Edited by A. A. G. Lewis, M.D., for the Renal Association, and G. E. W. Wolstenholme, O.B.E., M.A., M.B., B.Ch., for the Ciba Foundation, Little, Brown and Company, Boston, 1954. 333 pages, $6.75.

This volume, like other symposia of the Ciba Foundation, embodies the verbatim proceedings of a conference of outstanding participants from several countries. General subjects included structural and functional relationships, tubular transport, regulation of acid-base balance, electrolyte excretion, and control of volume of body fluid. Each presentation of original research or review of present knowledge on the specific topic was followed by informal, penetrating discussion. This publication offers new material of interest to students of renal physiology in health and disease. The informed practitioner will find much fundamental information here, but not in predigested or "practical" form.

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PSYCHOSURGERY AND THE SELF. Mary Frances Robinson, Ph.D., and Walter Freeman, M.D. Grune & Stratton, New York, 1954. 118 pages, $3.00.

Dr. Walter Freeman writes one short chapter summarizing the development and techniques of prefrontal lobotomy, transorbital lobotomy, topectomy and other psychosurgical procedures.

The remainder of the book is written by a psychologist, Mary Frances Robinson. This is a report on a research project in which the personality and psychological factors are studied in patients before and after psychosurgery. Details of the tests and testing methods are given together with various theories and conclusions. Nine pages of references in the field are given.

This is a book that will be of interest to psychologists and physicians working with these patients.

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MEDICAL PROGRESS—1955—A Review of Medical Advances During 1954. Morris Fishbein, M.D., Editor. The Blakiston Division, McGraw-Hill Book Company, New York, 1955. 346 pages, $5.00.

This is the third volume in a series which began with 1953 Medical Progress. It is divided into 20 sections, all on different aspects of clinical medicine, each by a different author. Each author summarizes the work in his field during the year 1954 as he sees it. For the most part these summaries are essentially brief notices and reports which point the way for further reading. They cover much the same field as similar yearbook series.

LECTURES ON THE SCIENTIFIC BASIS OF MEDICINE—Volume III, 1953-54. British Postgraduate Medical Federation. University of London, The Athlone Press, 1955—Published in New York, John de Graff, Inc., 64 West 23rd Street, New York 10.

In establishing this series of lectures, British medicine has really made a notable achievement. The high scientific quality of those who give the talks and the choice of important subjects are on the very best plane and must be of inestimable value to the general doctors who hear or read these talks. The present series, Volume Three for 1953-54, contains 21 lectures. The subjects vary from those which deal mainly with purely basic matters to those which are practical. Thus the first essay is entitled "Science and History" by H. E. Sigerist. Other fundamental subjects are "Reactions to Bacterial Invasion," "Antiviral Immunity," "The Genetics of Some Biochemical Abnormalities," etc. Of more immediate practical importance we have for example a lecture on "Antimalarial Drugs," one on the "Causes of Failure in Antibiotic Therapy" and one on "Stress and Thyroid Activity." The volume is handsomely gotten up and there are excellent bibliographies.

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CEREBRAL VASCULAR DISEASES—Transactions of a Conference Held Under the Auspices of The American Heart Association, Princeton, New Jersey; January 24-26, 1954—Irving S. Wright, Chairman and E. Hugh Luckey, Editor. Grune and Stratton, New York, 1955. 167 pages, $5.50.

This short volume reports the contributions of a panel of experts to a conference on cerebral vascular disease. The presentation is that with which we are now familiar; the subject was broken up into 14 subheads, with an authority on each subject conducting the forum, and the contributions of the various members reported in stenographic style, slightly edited to be sure. This is of considerable interest if one is familiar with the contributors, but makes for confusion and difficult reading otherwise. Nonetheless, it is well worth surmounting this obstacle to acquire the knowledge contained in the report. Considering the importance of cerebral vascular disease, which is growing with an aging population, a better knowledge of present concepts of pathology and treatment is a great advantage to the practitioner. This book contains that knowledge, as presented by experts in the various fields, and is worthy of reading by every physician.

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CLINICAL BIOCHEMISTRY—Fifth Edition—Abraham Cantarow, M.D., Professor of Biochemistry, Jefferson Medical College; and Max Trumper, Ph.D., Formerly Lecturer in Clinical Biochemistry and Basic Science Coordinator, Naval Medical School, National Naval Medical Center, Bethesda. W.B. Saunders Company, Philadelphia, 1955. 738 pages, $9.00.

With the ever-increasing influence of laboratory aids in the evaluation of problems in clinical medicine the physician is constantly seeking books to enable him to keep abreast of biochemistry and physiology. This book is an effort to bridge the gap for the clinician between the fundamentals of biochemistry and bedside medicine. It is good, but in the reviewer's opinion not so good as other similar works which have appeared within the past two years. The material covered is essentially the same in Bodansky's *Biochemistry of Disease* and Hoffman's *Biochemistry in Clinical Medicine*, but in this particular book the organization and approach is not so good, the development of the material is not so thorough or usable from the standpoint of the clinician, and some areas which have grown remarkably in recent years are not adequately elaborated upon. It is a good book but better ones have appeared in similar fields within the past year.

THE MANAGEMENT OF OBSTETRIC DIFFICULTIES—5th Edition. Paul Titus, M.D., Revised by J. Robert Willson, M.D., M.S., Professor of Obstetrics and Gynecology, Temple University School of Medicine. The C. V. Mosby Company, St. Louis, 1955. 737 pages, 348 illustrations, one color plate, $12.50.

A book which has survived four previous editions since 1937, and now appears in a somewhat new format under the guidance of a new author, possibly fills some sort of need in its field. Just what the need may be in this case is difficult to discern, because "The Management of Obstetric Difficulties" is not quite a complete obstetrical textbook, nor is it on the other hand merely a student manual or synopsis. For the most part it is now, in its new edition, a general dissertation on obstetric matters as they are presented in a sound and conservative manner to the students and resident staff in the Temple University Hospital. The title of the book always has been somewhat of a misnomer; certainly not all the subjects included in the table of contents can rightfully be considered difficulties, in the usual sense of that word.

The new edition in many respects is a great improvement over the previous one. The tedious pages of verbatim quotations from other writers have been eliminated, and virtually the entire text has been rephrased in a pleasant, easy-to-read style. In so doing, the editor has achieved the enviable feat of eliminating more than three hundred pages and nearly a hundred illustrations. The net result of this, of course, has been the production of a volume less costly than the previous edition—a rare event in this age of soaring publishing costs. Those who are familiar with the earlier editions will be pleased to see what a splendid job of facelifting Willson has done. Those who are attracted for the first time by the catchy title, expecting to find here answers not readily located in standard textbooks, may be disappointed.

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THE SPINE—A Radiological Text and Atlas—Bernard S. Epstein, M.D., Chief, Department of Radiology, The Long Island Jewish Hospital. Lea & Febiger, Philadelphia, 1955. 539 pages, 721 illustrations, $16.50.

In the practice of clinical radiology, one encounters perhaps more variation in the interpretation of roentgenograms of the spine than almost any other part of the body. The reasons for this are multiple. Anomalies of the spine are frequent and of unlimited variation. Simple degenerative processes in the spine (such as vertebral body osteophytes, thinning of discs and so forth) are usually asymptomatic but frequently have symptoms ascribed to their presence. The early changes of bone infection and bone metastasis, especially when limited to small structures such as the pedicle or the articular processes, are easily overlooked in the absence of adequate stereoscopic projections. It is believed by this reviewer that the present work should aid in reducing such needless errata.

The book is divided into ten chapters. The first three deal with the normal spine, malformations and metabolic disorders. The next three deal with inflammatory, neoplastic and traumatic changes. There is then a section on the intervertebral discs, one on diseases of the spinal cord, and one on diseases of the hematopoietic and reticuloendothelial systems. Finally, there is a chapter on aortic aneurysms.

The text is comprehensive, but one might request additional material on differential diagnosis of some of the lesions under consideration. It is an unfortunate but well established fact that the response of bone and cartilage to insult of any type (be it infectious, traumatic or neoplastic) is often grossly similar. The roentgenograms merely reflect the gross or macroscopic pathology present, and therefore distinctive features are often lacking when the roentgenograms alone are considered.

The section on discography will undoubtedly be amplified in subsequent editions, as will the paragraphs on contrast aortography and angiography. It would be desirable to have additional illustrations on the *early* manifestations of ankylosing or rheumatoid spondylitis. The current ones illustrate the advanced bamboo spine and are not of use to the radiologist seeking examples of the early manifestations of this important disease in young men. Incidentally, the author continues the misnomer of Marie-Strumpell for the spinal variant of this disease. In actual fact, of course, Marie-Strumpell disease is spondylitis rhizomelique, or rheumatoid spondylitis plus ankylosing rheumatoid arthritis of the shoulder and the hip joints.

The sections on degenerative diseases of the spine are, in general, in consonance with current medical beliefs.

The illustrations are mostly of good quality and are reproduced in negative form. There is an adequate bibliography and index.

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ROENTGEN INTERPRETATION—Eighth Edition—George W. Holmes, M.D., Honorary Physician, Massachusetts General Hospital, Clinical Professor of Roentgenology Emeritus, Harvard Medical School; and Laurence L. Robbins, M.D., Associate Clinical Professor of Radiology, Harvard Medical School. Lea & Febiger, Philadelphia, 1955. 525 pages, 371 illustrations, $10.00.

Correct diagnosis is the cornerstone of modern clinical medicine. It requires accurate observation and rational deduction. It includes differential diagnosis and provides a basis for prognosis. This monograph, properly utilized by medical students and physicians, will aid in correct diagnosis.

As in the earlier editions, there are twelve chapters. The first deals with confusing shadows and artifacts, the second with anatomical variations and the third with fractures and dislocations. There are then chapters on diseases of bone, the skull, the spine, and the joints. There is an excellent chapter on disorders of the chest, followed by chapters on the abdomen, gastrointestinal tract and genitourinary tract. Finally there is a chapter on fluoroscopy. The sections on disorders of the heart, lungs and gastrointestinal tract have been rewritten since the last edition. The illustrations are now all in negative form for the first time; most are of good quality. The bibliography is adequate and the index good.

In the examination of patients, radiological consultation provides two advantages: Firstly, it provides fluoroscopic and radiographic examination of good quality, and secondly (and even more important), it provides unbiased, independent interpretation. This book may be used to supplement such consultation.

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CHILDBIRTH—Theory and Practical Training—Marjorie F. Chappell, D.N. (London), S.R.N.E. & S. Livingston Ltd., London 1954. 128 pages, $2.50.

This is a small book intended as a guide for those who are engaged in organizing and training classes of pregnant women for childbirth. From the standpoint of information regarding the events of pregnancy and labor it is very incomplete. The principal theme relates to muscular activity during parturition. The author evidently accepts without question the thought that labor is largely a muscular event which can be aided or controlled by appropriate muscle training. Most of the book is taken up with the following considerations: Relaxation, pelvic-floor stretching, foot exercises, abdominal and costal breathing and back rubbing, panting breathing, pressure symptoms and postnatal exercises. Analgesia is discussed in terms of gas and air, trilene, and pethidine as administered under the supervision of midwives (in Great Britain). I do not believe that this is a book which has much value on the American scene.